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THE PICTURESQUE GEOGRAPHICAL READERS

BY
CHARLES F. KING

FIFTH Book

ROCKY MOUNTAINS
AND
PACIFIC
SLOPE



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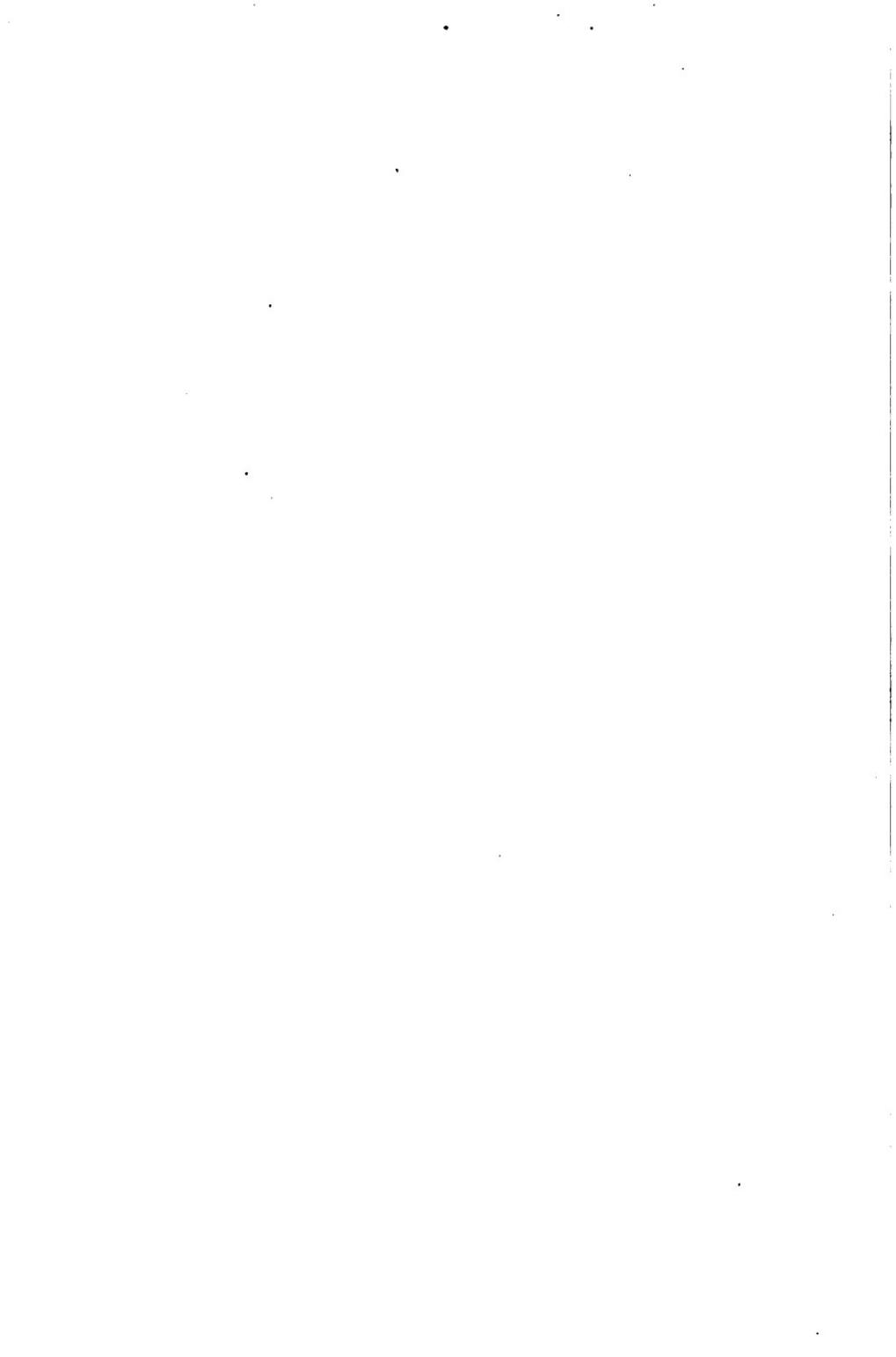
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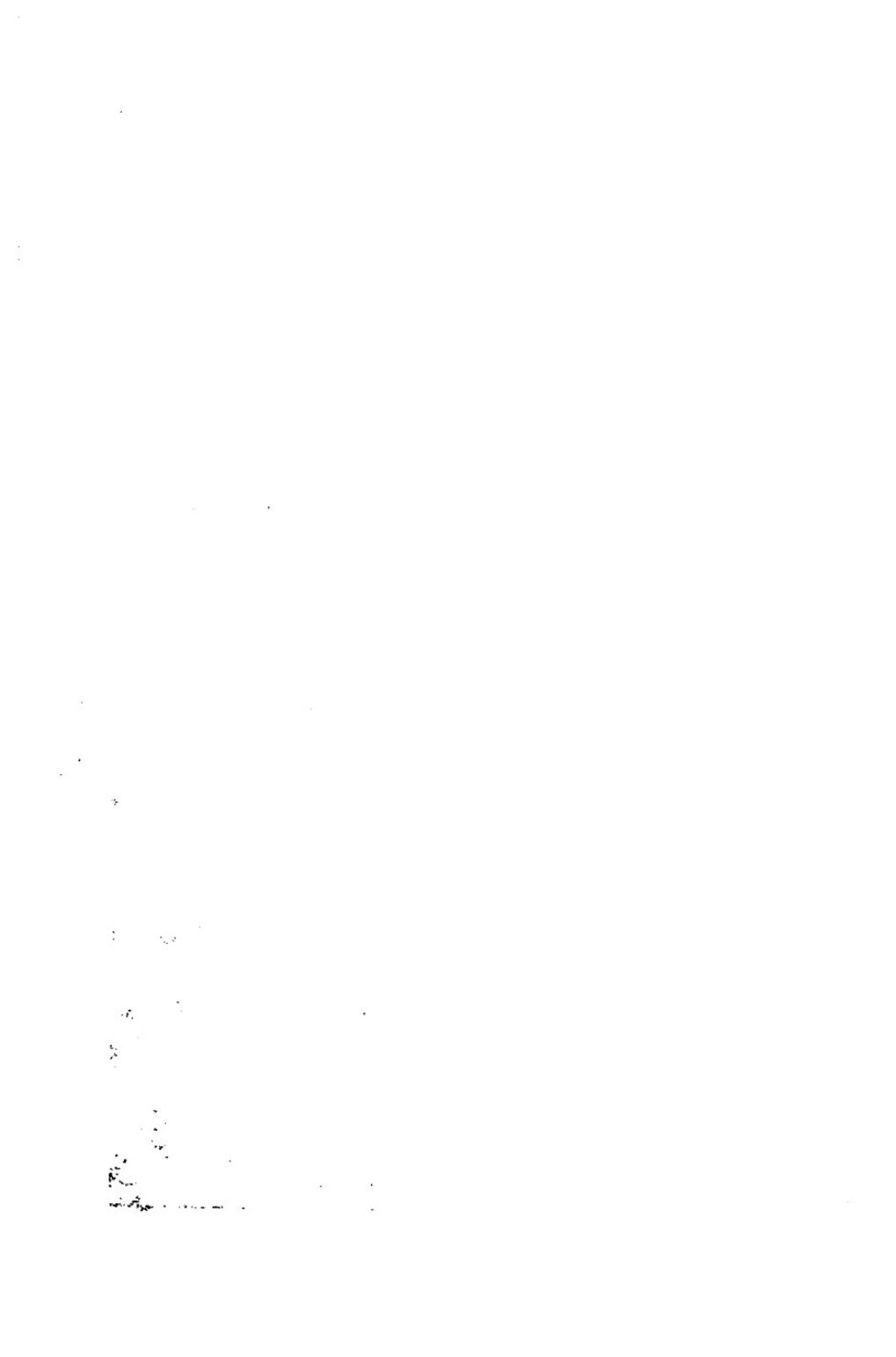
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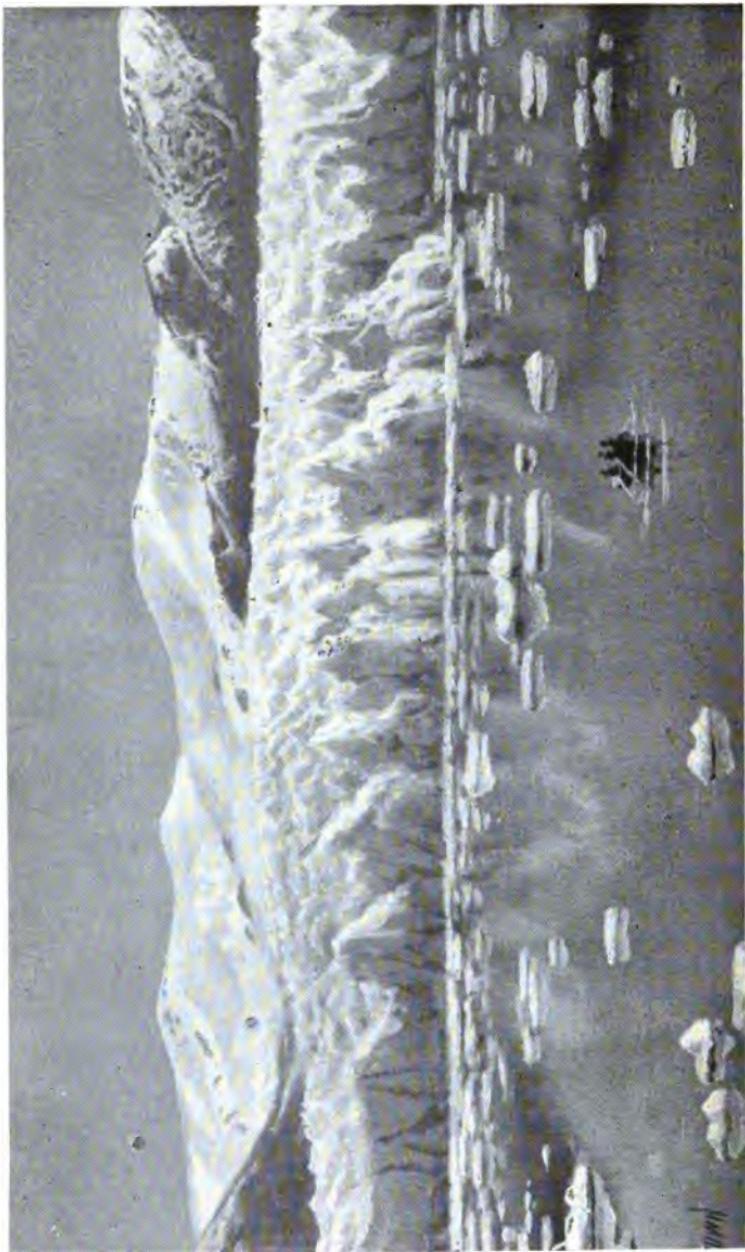


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TAKU GLACIER, ALASKA.

THE
PICTURESQUE
GEOGRAPHICAL READERS

BY
CHARLES F. KING
MASTER DEARBORN GRAMMAR SCHOOL, BOSTON; AUTHOR OF
“METHODS AND AIDS IN GEOGRAPHY”

FIFTH BOOK
THE LAND WE LIVE IN

PART III.
Rocky Mountains and Pacific Slope
SUPPLEMENTARY AND REGULAR READING IN THE LOWER
CLASSES IN GRAMMAR SCHOOLS PUBLIC
LIBRARIES AND THE HOME

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The Land we Live In. — Part III.

University Press
JOHN WILSON AND SON, CAMBRIDGE

PREFATORY NOTE.

THIS volume, the fifth of the PICTURESQUE GEOGRAPHICAL READERS, and the third in the series on the United States, completes the treatment of North America. Book III. of the series treats of the New England and Middle States; Book IV. of the Southern and Central States; the present volume describes the Rocky Mountains and the Pacific Coast.

Three volumes have been devoted to the United States because of its importance and general interest, and because it is *our own land*, which, strange to say, has not usually been considered in detail in most geographical Readers. This statement is particularly true of the section under consideration in this book,—a section in which there have been within the past few years greater changes and improvements than have ever been made before upon an equal area of the earth in an equal length of time. Forty years ago our western line of civilization extended to the Mississippi River; twenty years ago it had reached the Rocky Mountains, and Denver began to be; now the blue waters of the Pacific are its only limit. The children of

other sections need to know of our Pacific life and industries, that they may better understand our wonderful country.

Valuable suggestions and help have been received by the author from the eminent critic and educator, Mr. M. T. Pritchard, of Boston. Special assistance was also given the writer in the chapters "Our Army," by his life-long friend, Capt. D. C. Pearson, of the regular army.

In the Appendix will be found a valuable article on the making of lantern slides, contributed by Principal Lyford, of Worcester, Mass. He has made, in the way indicated, for use in his school nearly fifteen hundred slides. He has a special room for the exhibition of pictures by the solar camera. This room is in constant use when the sun shines.

THE AUTHOR.

TO THE TEACHER.

WHILE we believe that all children delight in illustrations such as this volume presents on almost every page, we feel sure that all children do not see pictures clearly and thoroughly. There is need then for the teachers who use these Readers to help the children in pictorial observation.

The children should first be taught to divide a picture into its natural parts, as the foreground, the background, on the left, on the right, upper part, lower part, upper right-hand corner, lower left-hand corner, etc. After these terms and their meanings become familiar to the pupils, then direct them to examine each part and tell what they see.

At first it may be necessary to help the class still more by judicious questions.

Suppose for illustration the teacher first selects, on account of its size and clearness, the picture of the Hudson River, page 66. Such questions as these may be asked : — What do you see in the foreground? in the background? What are seen in the four corners of the picture? in the middle? on the right? on the left? What kind of mountains? What kind of trees? What building on the left? What kind of a vessel in the centre? How is it propelled? Where is it probably going? What has it on board? Who are the crew? How wide is the river? how deep? Is the water fresh or salt? How does the Hudson compare in size with the Rhine? In length, with the Connecticut? How high prob-

ably is the mountain on the left? What is its name? Are those mountains on the other side of the river higher or lower? What are all these mountains called? What grows on the side of the mountains? on top? Do they look like mountains easy to climb? Is there an island on the right? Who lives on it? Does the river flow on towards the right or the left of the picture? What is the name of the place in the distance? In what State is West Point? In what part of the State? How old is it? For what is it noted?

Most of these thirty-four questions can be answered by the pupils if they use their eyes and imaginations, and read the chapter in which the picture is found. A little drill now and then of this nature will soon help a class to see and to talk intelligently about pictures. The value of appropriate illustrations will thus be greatly increased and the pleasure imparted by them largely multiplied.

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THE LAND WE LIVE IN.

PART III.



LESSON I.

COWBOYS AND RANCHES.

THE Cartmell family consisted of Mr. and Mrs. Cartmell, Miss Gray,—the governess and teacher,—and four children. The names of the four children, according to their ages, were: George, the scholar; Florence, the fun-lover; Fred, the naturalist; and Nellie, the questioner. They all loved to travel. They began their travels years before, by taking day and week trips from their home in Lake View, Massachusetts. They soon ventured on a two weeks' trip through Canada, to Vancouver;¹ then on a journey to the wilds of Maine, and to the Nation's Capitol.² Afterwards they went on

¹ See Second Book.

² See Third Book.

trips, lasting several months, among the Southern States, and as far west as Chicago.¹

Now the faces of these travellers are turned still farther west, -- to the great mountains beyond the wheat



A NEW HOME IN THE FAR WEST.

and corn fields of the central portion of our country. From Chicago to Denver is a ride of thirty-five hours in the fastest express. Mr. and Mrs. Cartmell and Miss Gray helped the children to enjoy it by talking the first day about railroads and Indians.

Instead of going through on the same train, they stopped over the second day at Kansas City, in Missouri. The wonderful growth and enterprise of this city surprised them. Like Chicago, it encountered many natural obstacles to development; but the railroads, the river, the central situation, and the enterprise

¹ See Fourth Book.

of its people forced it to grow. It is spread out on the bluffs, far above the banks of the Missouri, where the party left the train at the railroad-station. When they rode about the city, not an acre of land could be seen which was naturally level. Cable-cars were used everywhere, instead of other kinds. Mr. Cartmell, in talking with a prominent citizen whom he met at the hotel, was surprised to learn that this place has very large stock-yards, and that the trade in live-stock is now exceeded



A "DUGOUT."

by that of Chicago only. The children perhaps remembered the place more especially because the dining-room at their hotel was in the top story, instead of being upon the ground-floor. While eating their meals in this elevated glass house, fine views were seen.

The next day the journey was extended westward to Salina, in the centre of Kansas, where they remained



A COWBOY.

"Who looks after the cattle, Father?" Florence inquired.

"The name **cowboys** is given to the men who take care of the cattle on the Western ranches. They live almost entirely in the saddle, and for this reason they have an awkward gait. They generally wear wide-brimmed hats, leather overalls, and large jingling spurs; they tie bright silk handkerchiefs loosely round their necks, and carry big army revolvers stuck in their belts.

"Most of the cowboys come to Kansas from the Southwest, and they learn to endure rough fare, dirt, hard living, and exposure of all kinds. A few young

people from the East go into the cattle business and succeed; but many become disheartened at the hard, solitary life, and go back to New England, never to return to the ranch."

"Notice, Mamma," said Nellie, "that we sometimes see here log-houses."



A RANCH-HOUSE.

"Those are probably ranch-houses, where families live who raise a great many cattle and horses."

"Is grazing much of a business, Papa?"

"The cattle business has become an important element in the trade of the Western plains, and, indeed, in the trade of the whole country. It has become so large that the railroads select and build their lines in reference to it as much as they ever did for the wheat crop of the Northwest.

"These ranches of the Western plains — Texas, New

Mexico, Colorado, etc. — are frequently owned by great cattle companies of Eastern or foreign capitalists. Several companies are Scotch and English. The absent stockholders furnish the money, and agents on the ground, or near by, manage the business. Millions of dollars from Scotland and England have been invested in these Western cattle companies."

"Does each ranch have a good many cattle?"

"Some of these herds are of enormous size. Some companies own as many as one hundred thousand cattle, while thirty thousand is not an unusual number.

"One of the best conducted of these great ranches is owned by Mrs. Richard King. It lies forty-five miles south of Corpus Christi, Texas. This ranch contains seven hundred thousand acres of land,—that is, as much land as there is in Rhode Island. Three hundred cowboys and twelve hundred ponies are needed to carry on its business."

"Please tell us how they take care of the cattle."

"In most places in the country very little feeding is necessary. In the high altitudes the grass cures on the stem almost as perfectly as if it were cut. Cattle do fairly well all winter with nothing but this dried grass. It can hardly be said that shelter is not required, but it is rarely provided. In some portions the cattle suffer fearfully from the blizzards which sweep over the plains. The cattle seem to realize when a blizzard is coming, and will huddle together in a most pitiful way. Moving round and surging about, they soon form a circle. The strongest push to the centre, and the weakest are crowded to the outside. Thus they wait while the blizzard rages, which varies from twenty-four to forty-eight hours. In

many cases those on the outside will be found frozen dead, while those within will survive.

"In Texas there are many ranches along the Rio Grande. San Antonio is the headquarters of the business. The cattle here do not suffer from the cold so much, but no ranch-owner ever stops to care for a sick animal; it does not pay."

"How are the cattle cared for on these farms in Kansas?"



DRIVING CATTLE.

"In Kansas the business assumes a somewhat different shape. Here the land has mostly passed into private ownership, and there is very little 'free range.' The cattle-men must own all the land they use. It requires, therefore, a much larger capital in proportion to the number of cattle kept. This is made up by closer

attention to details, and by greater care of the stock. The land is richer, and the cattle are of a finer grade.

"These great herds are not fed in the mass, but in 'bunches' of one hundred or two hundred each. Perhaps one hundred and twenty-five would be an average



THE ROUND-UP.

'bunch.' This is done for convenience of handling, for better care, and for health. These bunches are often fed and fattened differently, to prepare them for a different date of marketing; for cattle are prepared for market at different seasons of years, some for the spring market, and some for the summer and fall market. The larger sales are in the autumn, as the cost of winter feeding is heavy, and the gain in flesh only slight.

"In winter very little work is done. Most of the labor with the cattle comes in summer, and consists of

many 'round-ups.' The object of a round-up is to separate from others, and get together in one bunch, each man's cattle.

"The cowboys come together from various directions to the place selected for the round-up. For the first day or two there will be horse-racing, wrestling-matches, and foot-races. After this the cowboys drive in all the



BRANDING THE CATTLE.

cattle to be found in the vicinity for fifteen or twenty miles around. Then the owners 'cut out' from the great herd the cattle having their brand. The cows and their calves are put by themselves, and the calves are branded,—that is, certain letters are burned into the skin with hot irons.

"It is sometimes very hard work to keep a herd of cattle together. They are easily started, especially in the night. Then the cowboys must act as quickly as possible, and head off the running animals and drive

them back to camp. On dark, rainy nights this is not very pleasant business.

"When cattle are ready for market, they are driven to the railway. The railways maintain stockyards at convenient points, from which the cattle are driven into the cars. About eighteen is a car-load. The cars are always filled full, as the cattle ride much better when standing close together. Formerly the cattle suffered terribly in transit, going for days often without food or water. Now, however, the railroads are required by law to water them at certain intervals, and at longer intervals to take them out and rest and feed them. As much as is possible, too, the trains move in the night, when the air is cool. Men go with each train to look after the cattle and see that they do not injure one another by overcrowding, and to help up any that may fall down, or become in any way entangled.

"One person always goes with the men driving a herd of cattle, to carry the tent and needed cooking arrangements. He rides in the camp-wagon,¹ and usually has two pairs of horses. Frequently he is the cook as well as driver. He pushes ahead each morning, and finds a suitable place in which to rest during the night. The cattle can be driven about fifteen miles each day."

Miss Gray, the governess, then read to the children from a very interesting book, called "The West from a Car-Window," written by R. H. Davis. She read the chapter about "Ranch Life in Texas." The children wrote a composition on the train on what she read. Here is a part of what Fred wrote:—

¹ See page 1.

"When the owner of a ranch receives an order from Chicago for a thousand head of cattle, he sends a man out on a pony to tell the men in a certain pasture to 'round up' one thousand head of cattle. The cowboys go out on their ponies, and in a day or two bring together the cattle. Another set of men drive them to the railroad station, where the owner and the agent of the Chicago firm ride through the herd together, and if they disagree in reference to the fitness of any animal, it is referred to an outsider, whose decision is final.

"Texas is the great breeding State, from which the cattle are sent north to the better pasture lands of Kansas, Montana, and Wyoming.

"The cattle are separated on the King Ranch at the spring round-up by means of a cutting pen at the end of a chute. One end of the chute opens on a prairie, and the other runs into four different pens, guarded by a swinging gate easily controlled by a man. The cowboys drive into the chute together, steers, mules, horses, and calves, and the man at the gate moves it so as to allow each one to pass into his proper pen.

"The cowboys often sing in the evening to quiet the cattle, and to induce them to lie down and go to sleep. After a herd lies down, it is easily roused.

"It is very interesting to see a cowboy, mounted on his favorite pony, lasso wild horses. He throws his rope so that the loop falls gracefully over the head of any designated horse. Then he draws it back, and his horse plants both forefeet to help hold the roped animal. But this is very easy business compared with roping the horses by the feet when they are turning, jumping, and racing. A skilful cowboy can, on foot, throw a rope so as to send the loop-end around a horse's leg, and bring him to the ground."

LESSON II.

AMONG THE ROCKIES.

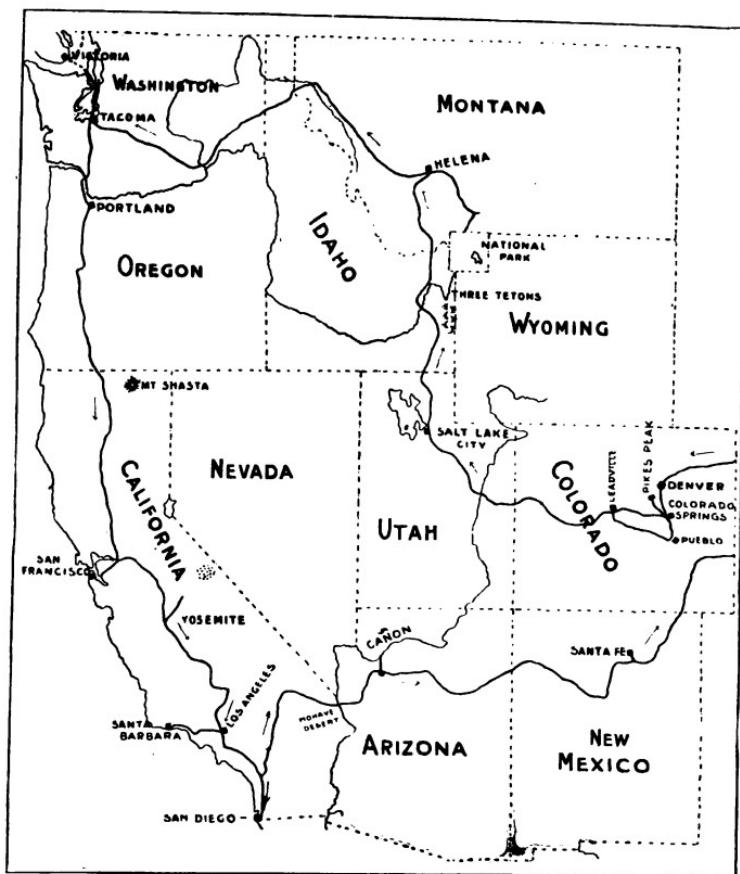
Part I.

THE westward progress of our friends was made known by the change of time at the little village of Ellis, in Kansas. The time was here changed from "central time" to mountain time, which is one hour later than "Chicago" time, and two hours later than "Eastern" time, or New York time. They reached Ellis at 7.55 A.M.; they left at 7.15 A.M., after waiting twenty minutes. So every one set his watch back one hour. Mr. Cartmell called their attention to the fact that they were rising higher and higher on this journey, although the rise was so gradual it could not be perceived by sight.

At Ellis they were about two thousand feet above the sea. At dinner-time they were more than a thousand feet higher. At six o'clock they were approaching Denver, and had risen to over five thousand feet above the sea. And yet no lofty hills or mountains, such as are seen in New England, were passed through. A change was soon to be noticed.

"Oh, Papa, see the **Rocky Mountains!**" exclaimed Nellie, as she glanced from her book out of the window.

"There is Long's Peak, sure enough!" cried Fred, who was looking out, on the right-hand side of the train.



ROUTE OF THE CARTMELLS.

"How do you know?" asked his mother.

"From the pictures I have seen."

All were soon at the windows, and gazing upon the mighty wall of stone which rose directly from the plain before them. It seemed as if they could not drink in half enough of the clear, cool, stimulating air, or the

wonderful beauties of the Rockies, about which they had read so much.

After securing rooms at Brown's Palace Hotel,—one of the principal hotels in Denver,—they took a long ride



THREE TETONS,
IDAHO.



LONG'S PEAK, COLORADO.

about this enterprising city, and were greatly pleased with the fine streets, the many elegant private residences and public buildings. The schoolhouses, churches, and business blocks were as large and handsome as those in Eastern cities.

Denver is perhaps prouder of her schools than of her fine business blocks. The pupils are gathered in buildings which would do credit to any city. Many of the ward schools are splendid structures, built upon the most approved plans; but the High School building in

East Denver, occupying a full block in the middle of the city, is her special pride. There are in the country few nobler structures for public-school purposes.



DENVER HIGH SCHOOL.

To the Cartmells, however, the mountains were more wonderful than was the beautiful city. Wherever a fine view of these lofty ranges was to be seen, there the driver was requested to wait till their eyes were feasted.

"That looks like the pictures of Gray's Peak, Papa," said Florence, pointing directly west.

"You are doubtless correct," said her father.

At the evening meal the children had a special request to make.

"May we go to Estes Parc to-morrow? We wish to see more of the mountain Miss Bird ascended with 'Mountain Jim,' and we also wish to find out if the 'parc' is as beautiful as it appears to be in her book."

"Yes, my dears, if you will get up in good season."

So the next day Mr. Cartmell, Miss Gray, and the children started from Denver on the narrow-gauge railroad, and in a few hours were in Longmont, beyond Boulder, not far from the entrance to the parc. Here they obtained horses, and rode into the far-famed parc, and feasted their eyes on the beauties about them.



VIEW OF THE ROCKIES, FROM DENVER.

"What do you say, Florence? Did Miss Bird say too much?"

"Oh, no; she did not tell half the truth."

"Words cannot convey to others the grandeur and beauties of this place; only pictures are able to do so," added Miss Gray.

As the party were returning to Denver, Mr. Cartmell took occasion to say,—

"You have justly admired to-day the beauties of Estes

Parc; but you must remember that this remarkable State of Colorado has a wonderful system of natural parcs, just as Chicago has of artificial parks. Every one in the system is many times larger than the one we glanced at to-day."

"Please tell us about them," the children eagerly requested.

"The parcs referred to are situated over one hundred miles west of this elevated plain where we are now, in the very midst of the gigantic ranges and peaks of the Rockies. The 106th meridian runs through these different valley-like plains. These parcs collect and send forth fresh water, somewhat as the heart sends out arterial blood."

"Where are these parcs, did you say?"

"Northwest of where we now are riding, over one hundred miles away, and nearly two thousand feet higher, is situated, north of Long's Peak and west of the first range, North Parc, which opens to the north, and sends out the North Platte River. Directly south of this parc is the Continental Divide, separating the former parc from its neighbor, called the Middle Parc. This is directly west of Denver. In it rise the upper branches of the mighty Colorado River, and flow away westward."

"I saw yesterday, Papa," interrupted George, "in Denver, a large photograph of a beautiful lake in that parc, showing a fine view, across the lake, of the mountains beyond."

"I think that you had better buy it for our album."

"I will do so to-morrow."

"Next in order of the parcs comes the South Parc, ending with Pike's Peak. This opens eastward, and



GRAND LAKE, MIDDLE PARC.



"THE LOOP," UNION PACIFIC RAILROAD, NEAR GEORGETOWN.

sends out the South Platte River. The Arkansas River rises south of Pike's Peak, far up among the Rockies. San Louis Parc is the fourth one, and it opens to the south. Its waters discharge, through the Rio Grande, into the Gulf of Mexico, after cutting through the

eastern range of the Rocky Mountains. This last mentioned parc is immense in size; it is as large as the three States of New Hampshire, Massachusetts, and Rhode Island. The others are somewhat smaller, but all are noted for excellence of form and grandeur of



DONKEY PARTY, COLORADO.

beauty. They were once the beds of immense seas. Their present appearance, when viewed from some lofty peak, is that of a gigantic bowl. Around the edges of this bowl rise the great mountains, above the line of eternal snow.

"The scenery in these parcs is said to be grand and imposing beyond description. The colors of the sky and atmosphere are intensely vivid and gorgeous. The air is dry and mild throughout the year. Storms of wind and rain are neither frequent nor lasting, and mud is never seen, as the land is well protected by the

surrounding elevations. The San Louis Parc is now crossed by numerous railroads, and occupied by thousands of people, on account of the discoveries of rich mines of silver. We shall see much of it before we leave the State."

"I understand," said Miss Gray, "that most of the ranges of the Rocky Mountains run north and south. Consequently, the sun's rays are received in the morning upon the eastern flank, at noon upon the ridge or



GATEWAY TO THE GARDEN OF THE GODS.

summit, and in the afternoon upon the western flank. Hence, these mountains cast no shadows during the day, as the mountains of Europe and Asia do. This fortunate arrangement in the Rockies must be highly beneficial to life in all forms."

"Yes, we shall probably notice it as we travel through the State. Ex-Governor Gilpin of this State, who trav-

elled through this section on foot many years ago, and was always so hopeful about its future growth, has lived to see all his prophecies become true, and to see, not one



IN MONUMENT PARK.

railroad merely cross the Rocky Mountains, but many lines in various directions."

Another day they rode on another narrow gauge railroad towards the foot of Gray's Peak, and passed over the spiral loops from Georgetown to Silver Plume, which Mr. Cartmell had told them about when they were discussing the difficulties of building railroads.¹

Then our party moved southward to Manitou Springs, — one of the most noted watering-places in the world.

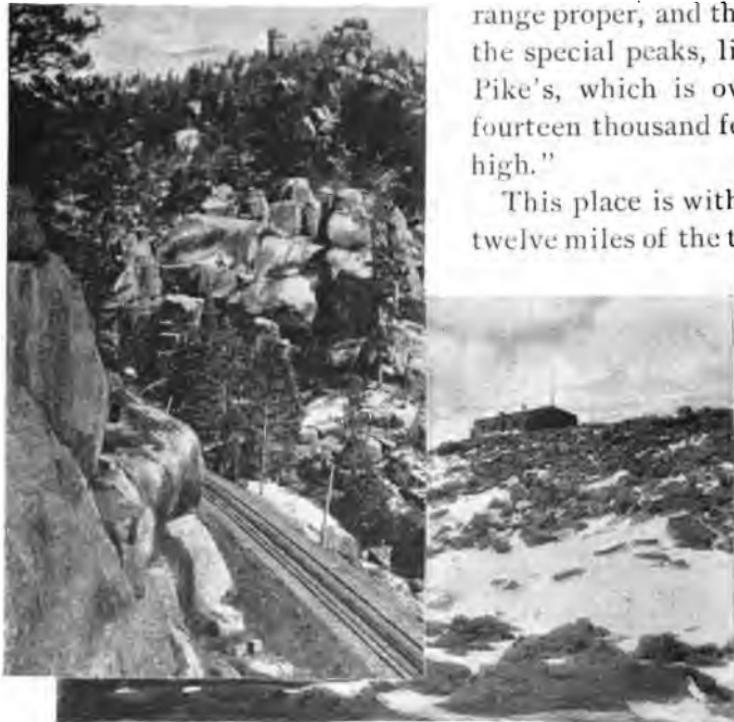
"In few places," said Mr. Cartmell, "can be found

¹ See page 20.

such a combination of splendid scenery, delightful climate, and health-giving mineral springs. You will notice that the mountains rise before you in three tiers, — first, the

foot hills, then the range proper, and then the special peaks, like Pike's, which is over fourteen thousand feet high."

This place is within twelve miles of the top



NARROW GAUGE AND SUMMIT HOUSE, PIKE'S PEAK.

of Pike's Peak. To the west tower the lofty peaks of the Rockies; to the east stretch the vast plains of the Central Slope. A week of unalloyed pleasure was enjoyed here. The smaller children rode the western burro, or donkey, every morning, under the care of a careful guide. The older folks followed custom, and took to the saddle as

naturally as if born and brought up in the West. In this way they visited the "Garden of the Gods," "Monument Park,"¹ the "Grand Caverns," and several noted cañons in the vicinity. But the most important trip the Cartmells made was to the top of Pike's Peak by railroad. The arrangement of the train and track is similar to that used on the White Mountain railroad. The centre rail is a series of cogs, like a ladder. A cogwheel, attached to the locomotive, runs upon this rail, and pushes forward the car as it turns.

The road would never have been built, if the burros had not helped carry things.

About fifty persons went up in the train. The ascent was slow, but the views were more and more beautiful and awe-inspiring. The plains and parcs below seemed

¹ See pages 22 and 23.



APPROACHING ASPEN, COLORADO.

to say, "Behold how fair a land thou dwellest in!" At the end of an hour the trees began to be stunted; flowers and ferns became less frequent. Then the timber-line was passed, and the air grew very cold, making it necessary to use every wrap which they had brought with them.

As they neared the top, the train passed round a curve where fine views were seen to the left.

"Oh, how cold it is!" exclaimed the children, as they left the car.

"Run into the old signal station," said Mr. Cartmell.

Here they found a roaring fire in a great stove, in July, double windows and double doors, and no one complaining of the heat. The building was constructed of stone, and seemed a part of the mountain. It is no longer used as a weather bureau station, but as a restaurant. The whole top of the peak is covered with boulders. Granite and snow were seen everywhere. Far away the beautiful *Sangre de Christo* range lifted its snowy peaks in the sunlit air. Gray's Peak and Long's Peak were seen away to the north. Over seventy unnamed peaks, each over thirteen thousand feet high, can be counted from this place. Green foot-hills rolled between, and numerous lakes glittered from their mountain backgrounds.

"This," said Mr. Cartmell, "is one of the grandest and highest summits we have ever stood upon. We are almost three miles above our home in Lake View."

It was too cold to eat their luncheon out of doors, so they retired to the warm room. Mrs. Cartmell felt quite dizzy, the air was so thin; and Nellie said, "Mamma, I feel queer."

"No one," said Mr. Cartmell, "stays on the summit more than three weeks at a time."

In two hours the descent was begun, and continued at the same slow rate of speed as that employed in coming up, in order to secure the greatest safety.



ALPINE PASS IN WINTER, COLORADO.

The children purchased, at various places in Colorado, numerous photographs, many of which are reproduced in this chapter. Florence was greatly pleased with one which represented so well a valley in this State. It was called "Approaching Aspen," — a town near the centre of the State. Fred liked the winter-scenes, especially the "Alpine Pass in Winter."

LESSON III.

AMONG THE ROCKIES.

Part II.

THE Cartmells remained several days at Manitou Springs, and then went southward by the Denver and Rio Grande Railroad to Pueblo, and thence **westward** among the grandest scenery in the world.

Not far from Pueblo, the railroad passes through the grand cañon of the Arkansas. The narrowest part is known as the Royal Gorge. Here the granite cliffs are a thousand feet high, smooth and unbroken by tree or shrub. Beside the track the river foams madly along its rocky bed. Far above, the sky forms a deep blue arch of light. At one place the difficulties of blasting out a bed for the railroad were so great that it was thought best to carry the track upon a bridge; and this bridge was hung from two iron rafters, braced against the sides of the cañon, instead of being supported from beneath. Miss Gray said that she remembered one stanza which well described this gorge:—

“Oh, this myriad-crested cañon,
With its walls of massive marble,
With the granite and red sandstone piled in peaks that pierce the sky:
Where no bird dare dip its pinion
In the narrow veil of azure,
Where the solemn shadows linger o'er the river rolling by.”

South of this part of the Arkansas River is situated the great San Louis Parc, or Valley, in which the Rio Grande rises. To the north is South Parc, which is drained by the Arkansas and the Platte rivers.

A few miles beyond, and the train reached Salida, — a prosperous town among the mountains, and seven thousand feet above the sea. Here the Cartmells changed to the narrow gauge road. The summit of the Great Divide was not yet reached. By rising higher and higher, Poncho Hot Springs were reached, and then Poncho Pass. Here the view became less obstructed by mountain sides.

The eye could roam over miles of cone-shaped summits.

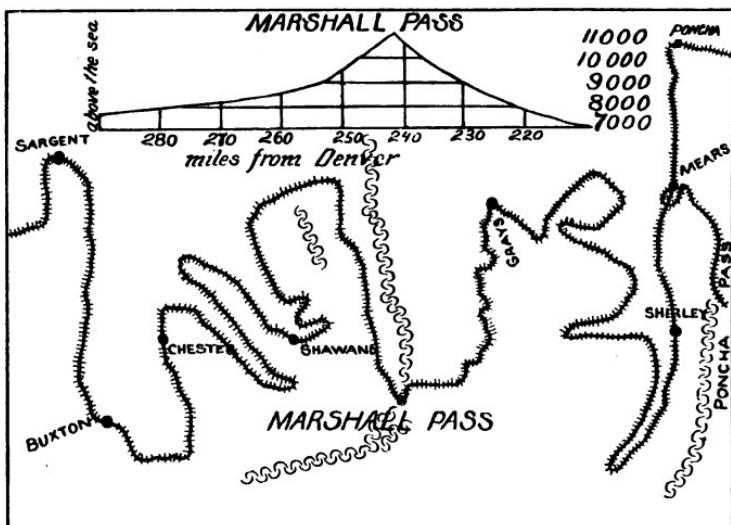
Mr. Cartmell, at this place, drew a map showing how the road had to wind about in order to get over the range. It was very interesting to watch how the track was laid out along the sides of the valleys, in order to make the grade gradually rise from one elevation to



ROYAL GORGE.

another. On the western side, in one place, four elevations of the track can be seen from one point; on the eastern side only two are visible.

"We are now," said Mr. Cartmell, "about to cross San Louis Parc on its northern edge, among some of



MAP OF MARSHALL PASS.

its most beautiful mountain scenery. Creede, Silverton, and Ouray—all great silver-mining places—are south of us, and Aspen and Leadville are farther north. We are fortunate in having such fine weather."

Fifteen hours of continued daylight by no means exhausted Nature's supply of wonderful scenes; but it exhausted the strength of Miss Gray and Mrs. Cartmell, and they both said, "I am filled with scenes of mountain sublimity, and anxious to rest and sleep."

But Nature seemed loth to grant the request. New

and grander beauties seemed to be ever coming into sight. Down through the narrow valleys and defiles west of the Great Divide, the train thundered swiftly along, and by and by entered the grand gorge of the Gunnison River, a branch of the Grand River. Along many miles of this vast gorge the railway lay upon a shelf blasted out of the solid rock. The walls rise up



MARSHALL PASS, EASTERN SIDE.

two thousand feet in height, and so close together the children could see the stars, although the sun was more than an hour above the horizon.

Through scenes like these, the Cartmells passed the evening, reaching Grand Junction about eleven o'clock, where they secured a sleeper, and retired to rest among the sublime beauties of the Rockies.

As Mr. Cartmell and his family were eating their breakfast the next morning, in the dining-car, the children noticed, from the window, a large river.

"What river is that, Miss Gray?" Nellie asked.

"It must be the Colorado River," said Fred.

"It is a branch of that river, called the Green River," replied Miss Gray.

In a few moments they slowly passed across it on a truss bridge.

"It is larger here than I expected," said Mr. Cartmell.

"Is this above or below the Grand Cañon, Papa?" inquired Florence.

"It is about fifty miles above the beginning of the great cañons. These cliffs on the right are called Azure Cliffs, from the color of the clay composing them. We are in the land of cañons, as you will see."

They passed through cañon after cañon, where great walls and domes were lifted upon either side in appalling grandeur.

The eastern section of Utah was very desolate, no vegetation at all to be seen, nothing but heaps of sand and barren wastes. After miles of sand come miles of sage-bush, which grows all the way from six inches to four feet high. Poor as this land was, they saw frequent signs of claims staked out, and now and then a hut where some pioneer was living. After weary miles of sage-bush, the train plunged into the heart of the Wasatch Mountains, and in the afternoon emerged into the beautiful and fertile valley of Utah, in the centre of which lay the long blue sheet of water called Utah Lake. Between the latter and Great Salt Lake was the Mormon City of the Plain. It was reached by passing through a fine farming section.

The next morning Mr. Cartmell and his family rode about Salt Lake City. The city they found to be beau-

tifully situated upon a plain partly surrounded by snow-topped mountains, which rise on the east in a semicircle, and nightly cool the air after the heat of the day. The Cartmell party climbed to the top of their hotel, where they obtained a grand view of the splendid valley. Twenty miles away to the northwest could be seen the



SALT LAKE CITY.

Great Salt Lake. In the opposite direction were the snowy mountains through which they reached the city the day before.

"Notice," said Mr. Cartmell, "this is especially a city of cottage homes, in which the people own their houses. The wide streets, the lines of shade-trees, fruit-trees, and luxuriant gardens make the city seem a mass of foliage."

In riding about the place they visited the celebrated Tabernacle, which is built in the form of an ellipse, and which has seats for eight thousand people. The audience

room is so well constructed that the dropping of a pin into a hat can easily be heard from one end to the other, — a distance of two hundred and fifty feet. Other churches are seen in different parts of the city, which now numbers nearly fifty thousand inhabitants. The streets contain two swiftly-flowing streams of pure water from the mountains.

"I understand," said Miss Gray, "that it seldom rains here, so the gardens and fields have to be irrigated, or artificially watered. In this way five crops of clover-like alfalfa grass can be raised in a year. The roots of this peculiar grass go down very deep into the earth, — sometimes forty feet, — and thus nourish the plant wonderfully."

"We have found," said George, "since we arrived, that the air is dry, and that it is hot at midday, and cool at night."

Mr. Cartmell changed his plans after consulting with his classmate, Rev. Mr. McNeice, of this city. Instead of going by the usual route to California, he purchased tickets over the Union Pacific to Butte City, in Montana.

The party started early in the evening, and saw, while the light remained, fine views of the great lake and the prosperity of Utah farms. Being weary, all retired at an early hour. They met for breakfast the next morning as the train was leaving Pocatello, in Idaho. Here George purchased a fine photograph of the celebrated Shoshone Falls, one hundred miles to the westward, on the Snake River. In a little while Snake River was crossed on a wonderful bridge. Beyond this, volcanic action was plainly seen on every side. The three Buttes

rose on the left, and the Three Tetons¹ on the right of the train.

"The latter," said Mr. Cartmell, "are very imposing mountains between us and the National Park."

At Beaver Cañon, several miles beyond, they might have left the train, and taken coaches directly for the



CRATERS OF THE GRAND AND TURBAN GEYSERS,
NATIONAL PARK.

National Park; but fearing the road would be very rough, they concluded to continue to Butte, and then pass eastward to Livingston, on the Northern Pacific, and thus reach the so-called "fairyland." One day was spent examining the mines in Butte, before going to the great Park.

¹ See page 15.

A week was happily passed among the glories of the National Park, which they had so faithfully studied at



NATURAL BRIDGE, NATIONAL PARK.

home. What they saw in that week, of cañons, craters,¹ hot springs, geysers, and every variety of scenery, caused them constantly to exclaim, "How much grander it is than I expected!"²

¹ See page 35.

² See the Second Reader in this series.

After leaving the National Park, Mr. Cartmell spent a few days at Helena. It is the centre of the picturesque in Nature. There is good grazing in this section. The grass is mostly a wild bunch-grass, growing from twelve to eighteen inches high. It is very sweet and nutritious. Montana is a great mining State, and hence Helena, far west of the centre of the State, but among the mines, became the capital. The mines here are gold rather than silver. The city has grown rapidly, has several banks, mills, libraries, business colleges, churches, and hospitals.

"A glance at the map will show," said Mr. Cartmell, "that Portland, Oregon, is almost exactly west of Helena; but to reach the latter place we must go a long distance to the north. Can you tell me, George, why this is necessary?"

"Because the Bitter Root Mountains, between Montana and Idaho, have at this section of the chain no pass suitable for crossing."

A REVIEW.

1. What kind of a city is Denver?
2. Tell what you can about the Colorado Parks.
3. Describe the picture called "Gateway to the Garden of the Gods."
4. How did the Cartmells ascend Pike's Peak?
5. Write what you remember about Marshall Pass.
6. What did the children see in Salt Lake City?

LESSON IV.

AMONG THE SILVER AND GOLD MINES.

IN the previous chapter, reference is several times made to trips undertaken by Mr. Cartmell and the boys to noted **silver and gold mines**. While in Colorado, special attention was paid to silver mining. Leadville¹ and other great mining sections were visited.

"Where are silver and gold found, Papa?" Fred asked, on one of these trips, as the homes of the miners were frequently noticed throughout the Rockies.

"The usual answer given to that question is that gold is found in California and Australia, silver in Peru and Mexico. That is true as far as it goes; but it is a fact that gold and silver are found almost everywhere, but not, in all countries, in sufficient quantities to pay for mining them. To-day both gold and silver are extensively mined in the Rocky Mountains, and we will talk only about this section.

"At present the United States produces about forty per cent. of all the silver mined in the world. This silver is worth one third as much as the pig-iron, one third more than the copper, and about half as much again as the gold. The silver is worth one quarter as much as the coal mined, and two thirds more than the petroleum.

"Silver mining investments are largely held in New York, San Francisco, Denver, Boston, and St. Louis, in

¹ See page 45.

the order named. One hundred and fifty thousand men are engaged in the business. The underground workmen receive from \$3 to \$3.50 a day.

"The amount of silver taken from the earth increases in this country every year. Recently it reached seventy million dollars for one year's yield. Bonanzas are still



MINERS AT HOME.

being found. Gigantic masses of silver ore have just been discovered in Colorado. 'The Molly Gibson Mine' has yielded rock worth twelve thousand dollars a ton; a single carload produced seventy-five thousand dollars.

"Many of the noted gold and silver deposits have been first discovered by accident. Captain Sutter, an intelligent Swiss settler in California, in September, 1847, was building a saw-mill on a river, and had occasion to let the water flow freely through a race-course. A great body of earth was thus carried away by the torrent, and shining particles of gold were revealed

behind the stones at the bottom of the canal. 'Old Pancake' Comstock — so called because he lived on pancakes chiefly—and two other miners needed water, and sank a well four feet deep; and in so doing came upon the



richest silver lode in the world. Comstock's name was given to the mine. This mine has sometimes yielded as much as ten million dollars a year.

"Minerals are deposited among these mountains in parallel zones, as the gold and silver map will show; starting at the Pacific side, we find in the Coast Range quicksilver, tin, and iron. In the next belt, the Sierra

Nevada, we first find in the foot-hills copper mines, and on the western slope of the great chain gold mines, extending as far north as Alaska. On the eastern side of the Sierra Nevada are rich silver mines, the most noted of which are found in and near Virginia City, in the western part of Nevada.

"This silver belt is hundreds of miles wide, extending into the Rocky Mountains.

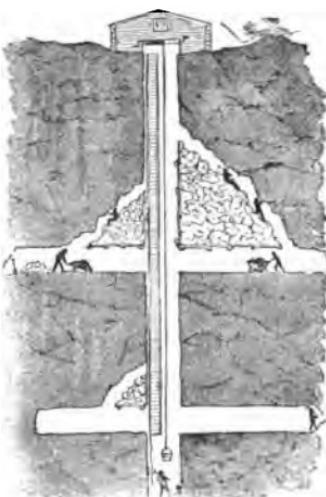
"In western Montana the precious metal becomes gold. In most cases gold and silver are found in different proportions in the same ores."

"How is silver for money and spoons obtained, Papa?"

"Silver does not occur in a native state as frequently as gold. Neither is it so often found separated from rocks in the beds of rivers. In most cases it is found in quartz or calc-spar, and associated with lead, zinc, copper, etc. Mining consists in getting the ore out of the mine, and separating the silver from the other less valuable matters."

"How do they mine the ore, Father?"

"In a manner similar to the way in which we saw them get out the coal in Pennsylvania. Mines are frequently opened, in a very simple and cheap way, by sinking a central shaft, and running out tunnels to the right and left every thirty or forty feet. If the mine is

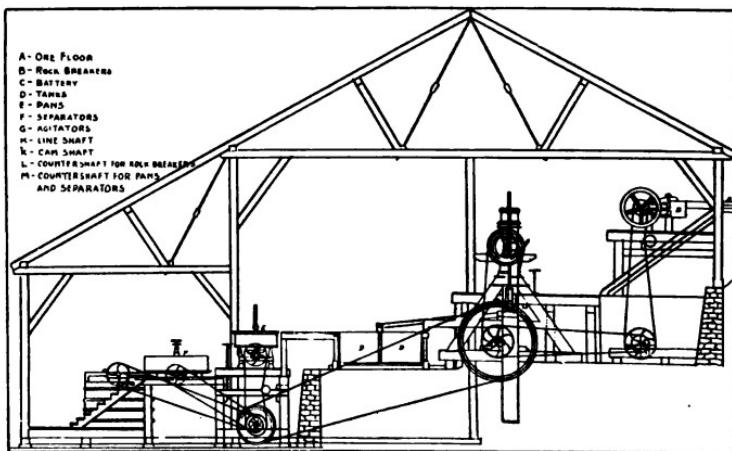


WORKING A SILVER MINE.

profitable, steam and machinery are soon introduced to increase the output."

"What processes does the ore go through after it is brought to the surface?"

"It is first broken up in the rock-breakers. These are similar to the same machines used in most cities for breaking up rock for making macadamized roads. Here



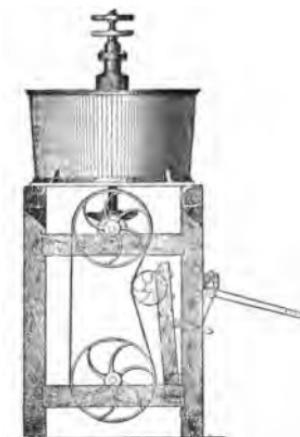
SECTION OF SILVER MILL.

is a section of one of the mills we recently visited. The ore is received at A, and put into the rock-breaker at B. From the rock-breaker it passes to the stamps at C. These are twenty iron pestles in a row, set in motion by steam or water power. Each one is raised by the power about eight inches, in such a way that they fall, not together, but irregularly, at the rate of ninety times a minute. As they are heavy, each one weighing three hundred pounds, every blow crushes the ore beneath, and soon reduces the crude material to a coarse powder.

"The crushed material is mixed with water, and this silver mud passes through a wire screen at one side of the mortar, and runs through a trough into tanks marked D, where it settles. The sand, or crushed ore, is next carried to the pan marked E.

"In this pan is also placed quicksilver, and here the ore is ground still finer, and carefully mixed with the quicksilver, the silver forming with the former an amalgam. From the amalgam pan the mixture is allowed to run into another pan, called a separator, marked in the drawing F. Here the fluid is gently stirred. As the heavier part settles to the bottom, the lighter portion is drawn off from the top into a larger tank below, called the agitator (G), which is similar to the separator. The heavy matter at the bottom of the last two pans is drawn off and strained, by which the amalgam and quicksilver are separated.

"The amalgam is now placed in a retort of a peculiar shape. About twelve hundred pounds are put in at once, and heated for eight hours. The heating drives off the quicksilver, changed to a gas, through the small end of the retort (b), into the condenser, where it is changed back to its usual form, which can be used again. About two hundred pounds of crude silver is left in the retort. This is melted, and cast into silver ingots. We saw, you remember, in Leadville, some very extensive smelting works."

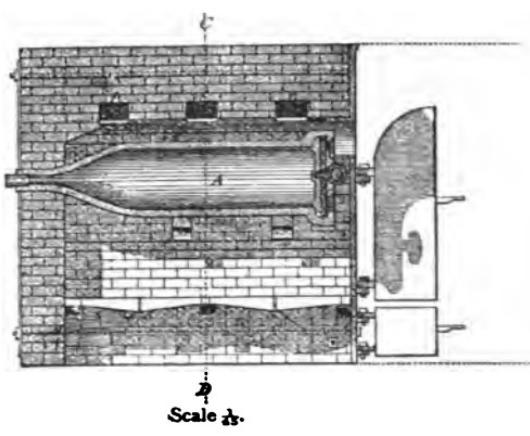


AMALGAM PAN.

When in Montana, Mr. Cartmell took his family to Butte, the largest mining city in the world, according to the statement of many travellers. While riding to the place, Mr. Cartmell answered several questions by saying:—

“As gold is more frequently found in its native state, and very often found separated from rock-formations, in

particles or nuggets, it is mined in more ways than silver. Gold is often found in alluvial deposits, next to the ‘bed rock,’ below the soil. The rocks in the vicinity have for centuries been worn away by frosts, rain, and streams



A RETORT FOR MELTING SILVER.

of water, which have loosened many particles of gold; and as the gold is heavier than lead, it naturally sinks to the lowest level, and thus it found its way to the bottom of lakes and river basins.

“The object of mining in these deposits is to separate the gold from the dirt and sand, and collect it by itself. This is called ‘placer mining.’ ”

On reaching Butte, our Eastern visitors found a very strange town. Half of the people work in the mines during the day, and the other half during the night. The liveliest hours of the day are at noon, when the

day-gangs go down to relieve the night-workers. The same activity occurs at midnight.

The gold in this vicinity is found at the bottom of gulches, at depths varying from six to fifty feet. Upon the bed-rock is a deposit, from three to four feet in depth, of gravel and bowlders,



LEADVILLE,
COL.

SMELTING WORKS, LEADVILLE, COL.

in which the gold is hidden. In one place they saw the patient Chinese using the pan and cradle to separate the particles of gold from the sand and dirt.

The pan they used is shaped like a milk pan. Dirt and water are put in, stirred up, and the muddy water poured off. This is repeated a number of times, till, finally, most of the particles of gold are left at the bottom, on account of their greater weight.

"What are these Chinese using, Father?"

"That is a cradle, and its shape is reproduced in the picture. The upper part can be moved back and forth

like a child's cradle. The miner puts dirt and water in this part, at the same time rocking it backward and forward. The fine dirt, water, and gold run through the holes in the bottom into the second box below, from which the water flows and leaves the gold."



THE CRADLE.

it up, and allows the gold to sink behind the bars. Mercury was frequently put into the trough to catch the smaller particles of gold.

Fred, who enjoys a bit of fun now and then, noticed in the ride through Butte the strange names employed for the claims, or gulches. Here are a few he then collected: Bean Gulch, Show-Down Gulch, Lost-Horse Gulch, Last-Chance Gulch, Magpie Gulch, Boomerang Gulch, Greenhorn Gulch, Yankee-Doodle Gulch, Ice-House Gulch, and Hail Columbia Gulch.

They found, in riding about Butte, that the cradle method was superseded by the employment of *sluices*. These were made like a long, narrow box, hundreds of feet in length, and having many 'riffles' across the bottom. A stream of water constantly flows through the sluice. The miners throw in the dirt, and the flowing stream quickly breaks

Miss Gray observed that the people in Butte and Helena frequently use the language of the mines in their ordinary conversation. A man fortunate in busi-



CANAL CUT THROUGH A MOUNTAIN.

ness has "struck the pay-dirt;" if unfortunate, he has "reached the bed-rock." A miner, in criticising a certain lawyer whose deeds were far short of his words, said: "When you come to pan him out, you don't find color." A person from the East who is not used to roughing it is called by the miners a "tenderfoot."

On the way back to Helena, late in the afternoon, Miss Gray spoke of another kind of "place mining," which they would see in California and other Western States.

"The sluice-box process, as we have seen it to-day in

Butte, answers very well if the pay-dirt contains a good deal of gold, or if there is not much soil and gravel above it to be removed. But in many cases it is too slow, and the miners form companies, combine their money, and employ hydraulic mining. First a supply of water is obtained from some river or lake. It is



HYDRAULIC MINING.

often carried long distances in flumes, or canals. Perhaps the canal runs through a mountain. The water is stored at some high point in tanks and reservoirs, from which it is carried to the place on a lower level by iron pipes and strong six-inch hose. A great pressure is thus obtained, and the water is thrown through the nozzle at the end of the hose with enough force to kill a man. Several streams are used at once, and high banks and large hills are rapidly washed away. The

water is made to flow in certain channels where large stones are placed, or through very large sluices, six or seven feet wide, which contain many large riffles, behind which the gold lodges, because it is so heavy.

"A large proportion of the gold now taken out in the United States," added Mr. Cartmell, "is found in some kind of rock, usually quartz. It is separated from the rock by mining, breaking, stamping, and uniting with mercury in almost the same way as silver is separated. One of the largest gold-stamping mills in the world we shall see, I expect, in Alaska, when we reach that far away country."

From Helena the railroad followed the narrow valleys of two streams westward to Mullon Pass, through grand mountain scenery. When the party emerged from Mullon Tunnel, which is three fourths of a mile in length, they found it difficult to realize that they were on the great watershed of the American continent, six thousand feet above the sea. Instead of towering crags, high walls of granite, steep ascents, and deep ravines, such as they had seen in the National Park and Colorado, they saw only gentle slopes covered with a luxuriant growth of grass and flowers, broad, natural meadows through which flowed swift streams, and by which grew a heavy belt of timber.

"This remarkable difference," said Mr. Cartmell, "is owing to the greater amount of moisture on the western slope."

About six o'clock the next morning Mr. Cartmell alighted from the train at Spokane Falls, in Washington, having crossed the narrow part of Idaho, and passed in the night along the northern shore of the beautiful

Lake Pend d'Oreille. He found this town to be the distributing point for the mines round about, and to be very prosperous. A fine river flows through the place, and near the station are situated the Falls.

LESSON V.

OUR ARMY.

Part I.

WHILE the Cartmell family were in Spokane Falls, Mr. Cartmell was greatly delighted to meet at the railroad station his life-long friend, Captain Pearson, of the **regular army**. They had not met for twenty years, and of course had many inquiries to make of each other.

"Where are you going to-day, Captain?" Mr. Cartmell asked.

"I am returning to my command at Fort Walla Walla, Washington. I cordially invite you all to accompany me."

The kind invitation was accepted, and thus the children obtained a chance to learn something about army life.

Captain Pearson knew how to make himself agreeable to the children, and on the long ride in the cars gladly answered their numerous questions.

"To what department of the army do you belong?" George asked.

"I belong to the cavalry, which in many ways is one of the most interesting parts of the service, because

we are mounted upon good horses, and can thus see and enjoy more than a man who is obliged to go afoot."

"How many regular soldiers are there in the United States?" Florence inquired.

"There are about twenty-five thousand men in the regular army, consisting of twenty-five regiments of



CAPTAIN PEARSON ON HORSEBACK.

infantry, or foot-soldiers, ten of cavalry, or horsemen, and five of artillery, or men who move big guns."

"What is a regiment?"

"An infantry regiment is composed of ten companies, each consisting of a captain, one first and one second lieutenant, sergeants, corporals, and privates. In the cavalry regiment there are twelve troops, or mounted companies. In the artillery twelve batteries constitute a regiment."

"I should think that twenty-five infantry regiments, ten cavalry, and five artillery regiments would make more than twenty-five thousand soldiers."

"It ought to number forty thousand; but few if any regiments are full, with one thousand men each."



ARTILLERY PRACTICE.

"Where are the soldiers located?" Miss Gray inquired.

"The artillery are most of them placed along the seaboard, in the different forts. The infantry and cavalry are in the western part of the country. Seventy per cent of the army is now west of the Mississippi River. Most of the border States have an extra number of military posts, to provide peaceful relations with our neighbors."

"Who are some of the commanders, Captain Pearson?" Mr. Cartmell inquired.

"Major-General Schofield now commands the army, with his headquarters at Washington. Major-General Howard has command of the Department of the East, General Miles, of the Department of Missouri, General Merritt, of Dakota, and so forth."

Just before reaching the station at Walla Walla, Captain Pearson showed the children a photograph of a company of cavalry, and remarked:—

"This is a picture of my company which has just been taken. I am sitting on my horse Billy, in the front centre. The first-lieutenant is on the right, and the second on the left."

"What is the color of your horses?" Fred inquired.

"They are all black but one, which is white; and he is mounted by the trumpeter."

"What flag is that?"

"That is not a United States flag, but the company's flag, or *guidon*, carried by the corporal."

The conductor at this point called out Walla Walla, and our friends left the train in a few minutes.

In riding from the station to the fort, Mr. Cartmell inquired about the town.

"Walla Walla contains some eight thousand people. It is situated in a valley of the same name, in the centre of a rich agricultural section, in which great crops of wheat, barley, and alfalfa grass are raised."

"What is the last?"

"It is a kind of clover, and three crops can be harvested here in a year."

In the evening Captain Pearson showed the children



MOUNTED CAVALRY.

a birdseye view of Fort Bowie, in Arizona, where he was once stationed.

"This picture," said the captain, "shows how military posts are usually arranged. In the first place, the fort was established here because some thirty years ago good springs were discovered here, and a supply of water in dry Arizona is a matter of prime necessity. There is also a pass here through the mountains, and all the overland travel takes this route.

"The smooth, level piece of land, with the flag-staff in the centre, is, of course, the parade-ground. Around the parade-ground are built the officers' quarters and the soldiers' barracks. The latter are on the side of the square nearest the front of the picture."

"What are barracks, Captain?" Fred asked.

"Barracks are usually a long, narrow building with a kitchen, mess-room,

store-room, bath-room, reading-room, and so forth, upon the first floor, and sleeping-rooms on the second floor. In the sleeping-rooms each man has his separate iron bedstead, mattress, sheets, pillows, and blankets; but he sleeps in a large, open room, with ten to twenty other soldiers. Each soldier makes up his own bed."



FORT BOWIE, ARIZONA.

"Where is the guard-house?" George inquired.

"It is the small, queer house near the entrance."

"What are those buildings on the left, where the hay is?"

"Those are the cavalry and quartermaster's corrals. The great piles of wood, for cooking and warmth in winter, are seen on the hill-side farther to the left. The water is brought from Bear Springs, beyond the pass, around the hill, to the engine-house, from which it is pumped to the reservoirs on the hill that supply the different parts of the fort."

The next day the Cartmells were all taken about Fort Walla Walla, and shown the various points of interest. The children noticed the many arrangements similar to those at Fort Bowie, as explained the night before.

The best houses about a fort are the officers' quarters. They are usually built of wood, double, for two families,



OFFICERS' QUARTERS.

two stories high, with a good veranda looking out upon the parade-ground. In the above picture the second house from the left is the commanding officer's.

While walking about the fort, and from the conversation of the older members of the party, the children learned a great deal about the daily life of the soldier.

From what they saw, and what Miss Gray told them, they learned that the soldier lives and moves at the sound of the *bugle*. He needs no clock. The bugle's

sharp call summons him from rest or sleep to drill or dress-parade, to his meals, to every duty of the day.

Reveille is the first roll-call at break of day. The morning gun is fired as the first note sounds. The soldiers rise and dress, and assemble to answer to their names as called by the sergeant, who reports to the captain the whole company as "present," or "accounted



SOLDIERS PRACTISING.

for," or certain ones as "absent without leave." There are two other roll-calls during the day. The second, at *retreat*, which sounds at sunset, and *tattoo*, which is sounded about nine o'clock. A little later the bugle sounds *taps*, when the lights are put out. When the bugle sounds the first signal for the cavalry to mount, it is called *Boots and Saddles*.

The soldiers become so accustomed to act as the bugle sounds that it affects their conversation. Instead of



TRANSPORTATION.

saying, "Why, it is four o'clock already!" they say, "Can it be possible? There is *stables*, and where has the day gone?" Horses learn these calls, and return from grass of their own accord at *recall*. Sometimes they drill at the sound of the bugle, without the help of the soldiers.

As Miss Gray finished telling them about this, the bugle sounded *Boots and saddles*, and soon about thirty cavalry-men galloped from the fort. Captain Pearson explained that they were going out to practise skirmishing with Indians. A part of them represent the Indians, and the rest the United States soldiers.

"Do you ever have to move your quarters?"

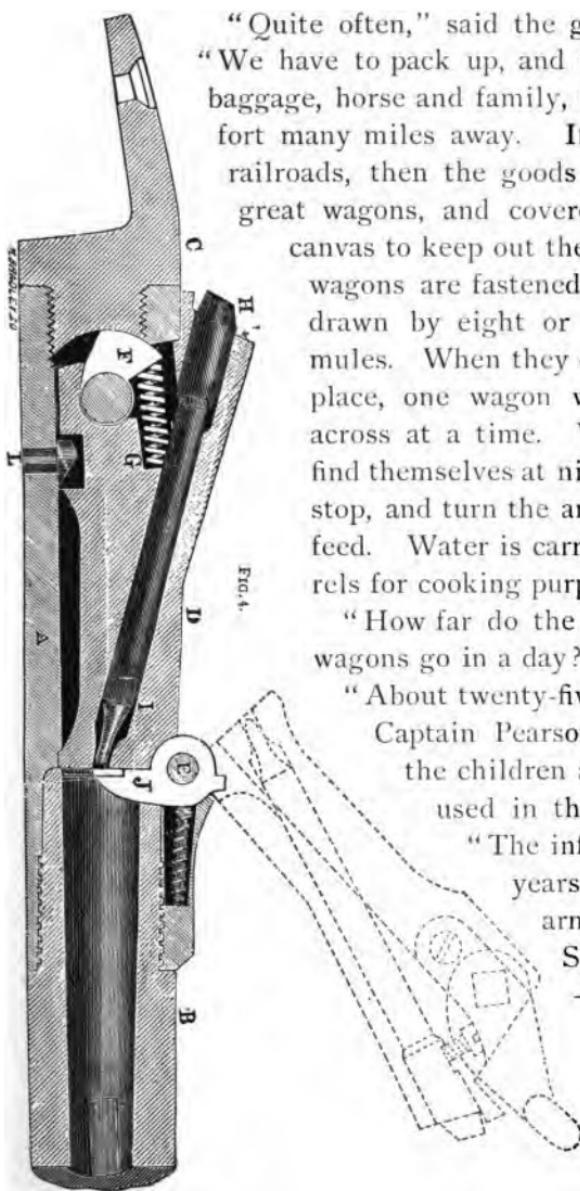
"Quite often," said the genial captain. "We have to pack up, and move bag and baggage, horse and family, to some other fort many miles away. If there are no railroads, then the goods are placed in great wagons, and covered with heavy canvas to keep out the rain. Three wagons are fastened together, and drawn by eight or ten horses or mules. When they come to a hard place, one wagon will be moved across at a time. Wherever they find themselves at night, there they stop, and turn the animals loose to feed. Water is carried in the barrels for cooking purposes."

"How far do the transportation wagons go in a day?"

"About twenty-five miles."

Captain Pearson explained to the children about the rifles used in the army.

"The infantry for many years have been armed with the Springfield rifle, — named from the place in Massachusetts where they are made by the Government.



SPRINGFIELD RIFLE.



RIFLE.



CARBINE.

The Armory in that city was once visited by Longfellow, who wrote a fine poem about it, beginning:—

“This is the arsenal. From floor to ceiling,
Like a huge organ, rise the burnished arms;
But from the silent pipes no anthem, pealing,
Startles the villages with strange alarms.’

“The rifle is a breech-loader, thirty-two and a half inches long. It weighs about eight pounds. The breech block is hinged on top of the barrel, and is thrown forward, when open, to put in another charge. At the same time the empty metallic shell is thrown out. The gun is fired by the hammer striking the sloping firing-pin, which transmits the blow of the hammer to the priming of the cartridge. This rifle will send a bullet with great accuracy.

“The navy uses the Remington-Lee rifle. It has a magazine, containing five cartridges, which can be attached to the gun, just in front of the trigger, or removed at pleasure.

“These cartridges are pressed, as needed, into the firing chamber by means of a spring.

The five charges can be fired in a few seconds.

"The gun used by the cavalrymen is called a carbine. It is very much like the rifle, only the barrel is about two thirds the length of the rifle, and no bayonet is used with it. At the World's Fair the Government manufactured these rifles, to show the people how they were made.

"The Government has just introduced a new rifle for the use of the infantry, and will no longer make the old gun. The new weapon is modelled after the one used by the Danish troops. It is a magazine rifle, the magazine holding five cartridges. This rifle can be fired by single-loading, while the cartridges in the magazine are held in reserve. It can be fired very rapidly and with great accuracy. These rifles weigh less than the Springfield, and carry a smaller bullet. Smokeless powder is used with them."

LESSON VI.

OUR ARMY.

Part II.

"WHERE were you educated, Captain?" Nellie asked at the breakfast-table.

"At West Point."

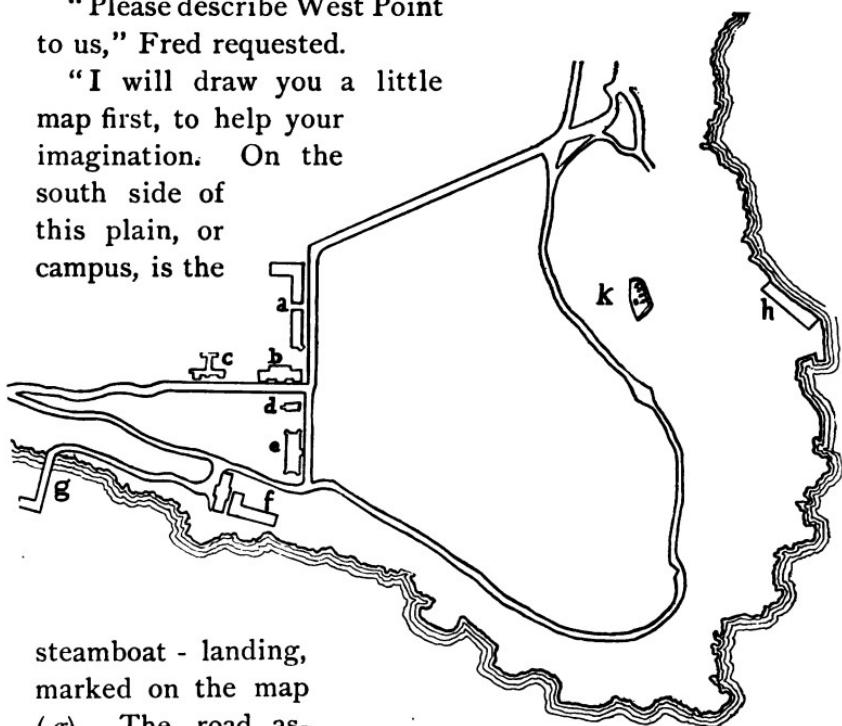
"Where is that place?"

"It is a small town, three hours' ride from New York City, on the right bank of the Hudson River, among 'unrivalled Rhinelike landscape.' The situation is at

a sharp bend in the river, where there is a large elevated plain, surrounded by various buildings used in the education of the cadets, or young soldiers."

"Please describe West Point to us," Fred requested.

"I will draw you a little map first, to help your imagination. On the south side of this plain, or campus, is the



MAP OF WEST POINT.

steamboat - landing, marked on the map (*g*). The road ascends as the visitor rides towards the village. He will come first to the Riding Hall and Stables (*f*). The former is built of stone, spanned by a single curved roof, and is said to be the largest building in the United States for riding exercises. In the stables near by are stalls for one hundred horses. On the main street, opposite the campus, or parade-ground, stands, next to the last-mentioned building, the Library

and Observatory (*e*), the Chapel (*d*), and Academic Building (*b*).¹ This last building, of stone, was erected long ago, and contains the chemical department, several recitation-rooms, the fencing and drawing department, and the gymnasium.



MESS HALL, WEST POINT.

"Beyond the Academic Building, and farther south, stands the Mess Hall (*c*), dear to every cadet, when a good man had charge of the supplies and the cooking of the food.

"The central hall is the Mess Room, or eating-room, for all the cadets. One of the largest buildings in West Point is the new Cadet Barracks, erected in 1851 (*a*).

¹ See page 68.

It contains one hundred and seventy-six rooms, each fourteen feet by twenty-two. Most of these rooms are occupied by the cadets. The distance round the parade-ground is one mile."

"What else is there of interest?"



SIEGE BATTERY, WEST POINT.

"The mortar and sea-coast battery (*k*) is placed on the banks of the river, and affords a fine view of the water and surrounding mountains. The battery is about as old as an old-fashioned stage-coach, and would not have much effect on a modern naval war-ship."

"What else can be seen from the campus?"

"If you look up the river northward, you can see to Newburg, nine miles distant. When the atmosphere

is very clear, the Catskill Mountains can be seen, in the same direction. The river is usually dotted with steamers and vessels. In the distance is Storm King Mountain, behind which nestle the valleys of Cornwall. Nearer rises the Crow Nest, fifteen hundred feet above the river, with its overhanging cliffs and precipices. As one of the cadet poets once wrote:—

“ ‘ When Hudson’s wave o’er silvery sands
Winds through the hills afar,
Old Crow Nest like a monarch stands,
Crowned with a single star.’ ”

Captain Pearson spoke in the highest terms of his beloved West Point. Its high standard of study was shown, he said, by the fact that out of one hundred and twenty men who entered his class, only thirty-nine remained to graduate.

“ What benefit did you derive from your military education, Captain Pearson? ” Mr. Cartmell asked.

“ You can hardly think of a point in one’s make-up which is not touched upon by this West Point education. Respect for authority is required from all. A cadet learns that respect for authority goes along with self-respect. That is to say, a proper respect for yourself will never permit you to be stubborn, disrespectful, or ungentlemanly on any occasion.

“ And so it is that whenever a cadet meets his instructor or a professor, or the captain of his company, he promptly salutes him, by raising the hand to his cap, which salute is likewise given in return by the officer or professor. So far from being considered a loss of dignity to show this respect, it becomes a second nature, and creates a spirit of good order and discipline, which

THE HUDSON, FROM WEST POINT.



are not only necessary in military life, but which are often sought for by large business firms all over the world."

"Please tell us something about your daily life at West Point," Fred asked.

"A cadet," replied the good-natured captain, "has to rise early, at the tap of the drum, hurry into his clothes, and down the iron stairways to the area of barracks, fall into rank at reveille roll-call, and answer to his name."

"What next do you do?" Nellie asked.

"Then you go back to your room, make your beds, sweep out your room, and complete your toilet, which includes a shave every morning. Then, in half an hour after reveille, your room is inspected, and everything must be in first-rate order. Then you study till breakfast, which comes at seven o'clock. After breakfast, and until eight o'clock, you study more. Then, with others, you march to the Academic Building, without any talking or laughing or unnecessary swinging of arms. Any violation of rules in these respects will bring reports and demerits; if you receive one hundred demerits, you will be sent away from the Academy."

"At recitation you find yourself in a room with twelve other cadets and the instructor. Eight or ten cadets are sent to the blackboard to work out problems or write briefs of subjects assigned. When each has finished his work, he takes a pointer in hand, and faces about and waits in a soldierly position until the instructor calls upon him to recite.

"One cadet is called up to recite while the others are at the board. He is questioned upon the lessons of that day and the day before. All are marked on a scale of three. Perfect order is required.

"How long is a recitation?"

"Usually one hour and a half. After the recitation you march back to quarters to study again. Directly a rap is heard on your door. You spring to attention.



ACADEMIC BUILDING, WEST POINT.

An officer enters, and looks for dirt or dust or the misplacing of anything.

"If your washbowl be not inverted, you get a report; if your spare shoes are not in a straight line and blacked and dusted, you get a report; if your bedding is not neatly folded in the prescribed order, you get a report; if the articles in your clothes-press are not in their right shelves, you get a report; if any soiled article of clothing be found anywhere outside of the bag provided for

these things, you get a report; if your cap or overcoat is not hung up where it belongs, or if your rifle is not standing in its proper place, you get a report. The reporting-system never takes a vacation."

"Do tell us some more about the day's work."

"Well, from eleven to one you go to the Riding Hall,



DISMOUNTED CAVALRY.

which is carpeted with several inches of tan-bark, in case your horse throws you, and then runs off on a picnic all by himself. About one, you march to dinner, and back again to recitation. After the recitation you go to drill and dress-parade.

"At dress-parade the adjutant publishes to the battalion the demerits of the previous day. It reads as follows, — Adams: Laughing in ranks marching to break-

fast. Bacon: Taking his seat in mess-hall before the command was given. Brady: Dirty collar at dinner. Garrison: Dust on mantelpiece. Jones: Wearing cap on side of the head. Pearson: Not keeping step in ranks marching from supper."

"Did you get a demerit for a little thing like that?" Florence asked, quite astonished.

"Yes."

"How very strict! Do you have any liberty at all?"

"Not much. After dress-parade you march to supper, then back to your room to evening study until 9.30, when you may go to bed, or until ten, when you must be in bed, with lights-out, at the sound of a drum. And you sleep, and you sleep. Nevertheless, as a precaution, your room is likely to be invaded any night by an inspector with a bull's-eye lantern, to see if you are absent."

In the afternoon all were pleased to witness a review of five companies of cavalry dismounted. Sometimes the review is, as in this case, without horses, but more frequently it is given with the troops mounted.

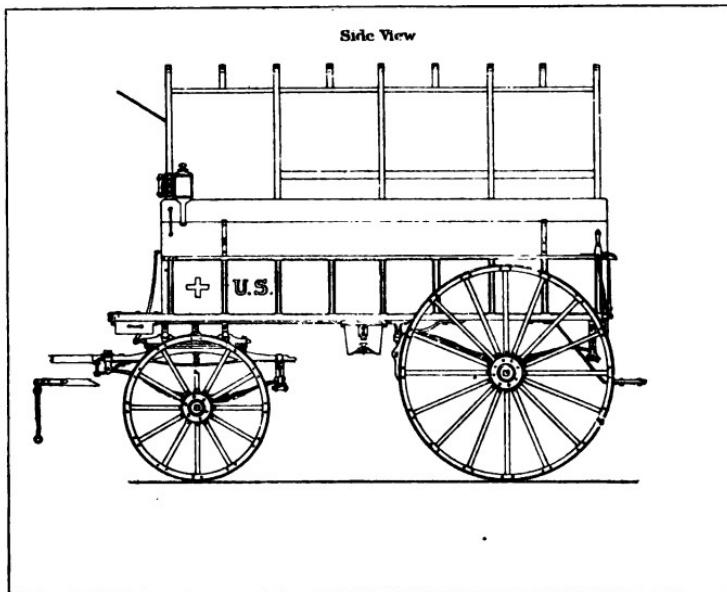
This parade-ground is ample in size, and the troops appeared well in their evolutions. The flag-staff is on the right, near the cannon. The low buildings beyond the band-stand contain the adjutant's office and commissary department. The latter furnishes the supplies for the men.

The town of Walla Walla can be seen in the distance.

"What pay does the soldier receive, Captain?" Mr. Cartmell asked.

"The private soldier is paid thirteen dollars per month for the first and second years. This is increased one

dollar per month each year afterwards till the sixth year, when he is paid eighteen dollars a month. The corporal begins with fifteen dollars per month, and the sergeant with seventeen. Their pay is increased after the third year.



RED CROSS AMBULANCE, WITHOUT COVER.

"Besides the pay, the soldiers receive their clothing, rations, quarters, and medical attendance, which explains why the pay is so small in money. A soldier who is a carpenter, plumber, or painter is often relieved from all military duty, and placed upon the work of his trade. In such cases he receives, besides his regular pay, an extra allowance of fifty cents a day."

"What pay do the officers receive?"



GENERAL OF MILITIA.

"The second lieutenant receives at first fourteen hundred dollars a year; first lieutenant, fifteen hundred; captain, eighteen hundred; major, twenty-five hundred; the colonel, thirty-five hundred; the general, thirteen thousand five hundred. All officers receive quarters and forage for their horses, when mounted. This pay is

increased ten per cent for every five years of service, till forty per cent has accrued, beyond which there is no further increase.

"At sixty-four years of age officers are retired by law, and receive for the remainder of their lives three fourths pay. Many of them settle in the large cities, especially in Washington, D. C."

"Where do the officers come from?" Florence asked.

"Most of the commissioned officers graduate at West Point."

"I suppose the soldiers do not have to go to school, Captain," Nellie remarked.

"Oh, yes, some of them do," he replied. "At each post there is a school for the soldiers who need instruction, and they are obliged to attend until they become versed in arithmetic, United States history, and geography."

"Who teaches them?"

"The teachers are well-educated soldiers, who receive fifty cents per day extra pay."

"What does a soldier do when he is sick?" Mrs. Cartmell asked.

"Sick soldiers are taken care of in the hospital, where they receive the best of attention. They are carried from place to place in a special wagon, with very good springs, called an ambulance."

"Have you ever heard, boys, of any soldiers near home?" Mr. Cartmell asked.

"Yes," replied George, "the *militia*. In some Western States the militia are called the National Guard. These troops are relied upon to protect property, put down riots, and in general to help the police when

INFANTRY IN THE MILITIA.



needed. The number enrolled in the different States amounts to about one hundred thousand men.

"In most of the States the Governor is the commander-in-chief of this militia. The various companies are composed of volunteers, with their proper officers, as in the Regular Army. Most of the companies belong to the infantry. The highest officer in the State militia



SIGNAL CORPS.

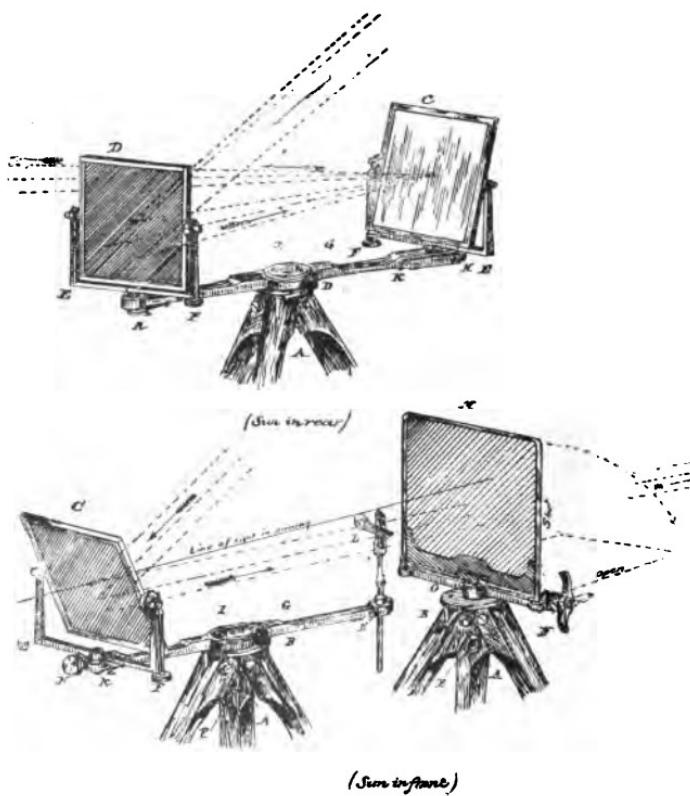
is usually the general. His uniform is shown in the picture.¹

"Some States have as many as forty companies organized and equipped. These companies meet frequently in their armories for drill and exercise. Each regiment or brigade generally spends a week or more in camp during each year.

"While in camp, strict discipline is usually maintained, and much attention is paid to rifle practice by both infantry and cavalry. The soldier is also taught

¹ See page 72.

obedience to orders, to rely on himself, and to acquire steadiness of purpose. The annual cost to the State for its militia is very small.



THE HELIOGRAPH.

"The uniform worn by the militia differs in some respects from that worn by the Regular Army, as is shown in the cut on page 74.

"In some States a signal corps is organized, and

attached to one of the regiments. The corps when in camp practise in signalling with wands, flags, torches, and heliographs, and the use of telescopes.

"Signals are sent by flags to the distance of twelve miles, and by heliograph two hundred miles. In the latter, communication is made by reflections of the sun upon a mirror or system of mirrors. The mirrors turn readily, and flashes of light are sent from point to point. Spaces of time are used to indicate letters and words to the eye, just as in the telegraph the same are indicated to the ear through sound."

The next day the Cartmells bade Captain Pearson a reluctant farewell, and proceeded farther west. They purchased tickets by the Northern Pacific directly to Tacoma, in Washington. They selected this course instead of going to Portland, on the Columbia River, because it was shorter, and they hoped by so doing to catch the regular steamer for Alaska.

LANGUAGE LESSON.

LET the teacher first call upon different pupils to reproduce *orally* the last two chapters on "Our Army." The teacher may make it pleasant by asking a few questions.

Then let the pupils write an abstract, using the following topics: Walla Walla, A Regiment, Fort Bowie, The Bugle, A Rifle, West Point, Soldier's Pay, Militia, The Signal Corps.

LESSON VII.

THE CARTMELLS IN ALASKA.

First Week.

A FEW days of rest were enjoyed in Tacoma. Of course George looked up his cousin Mary, and she showed him her favorite mountain peak,¹ with its fifteen glaciers.

From Tacoma they all went to Victoria by steamer, stopping one day in Seattle. On this trip Mr. Cartmell called the children's attention to the beauties and commercial advantages of Puget Sound, — the "Mediterranean of the Pacific." "Notice," he said, "that it is a broad, deep gulf or inland sea, running for hundreds of miles, in Canada and the United States, between high rocky shores. Ships of the largest size can sail everywhere, and come close to the shore to load or unload, so steep are the banks."

Victoria is at the southern end of Vancouver Island. This island is twice as large as Massachusetts. Victoria is the capital of British Columbia. Her situation is fine, overlooking the straits and sound and the water-way to lofty, snow-capped mountains, in Washington. The view of Mount Baker is especially beautiful.

As Mr. Cartmell was too late to catch the regular steamer for **Alaska**, he chartered the "Queen" instead

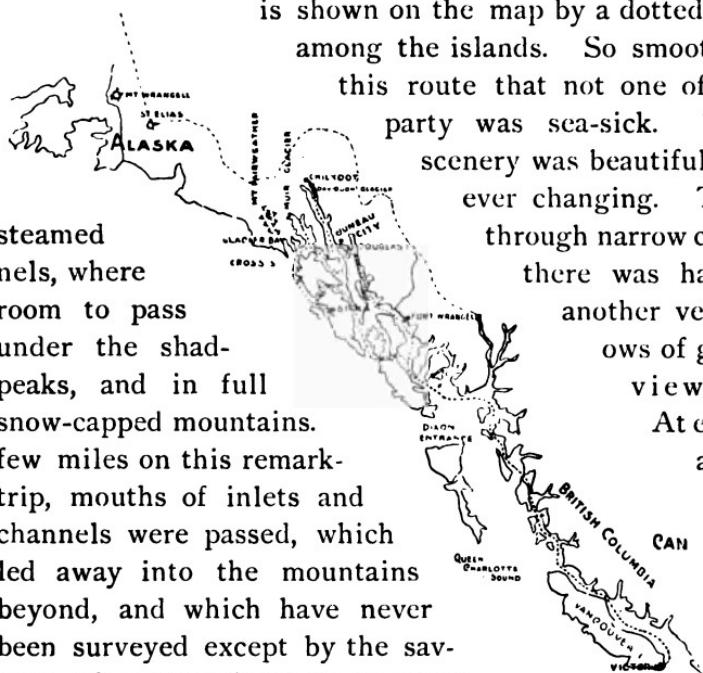
¹ See vol. ii. p. 58.

of waiting two weeks for the next boat. August 1st the trip to the land of "totem poles" began.

The course they took was what is called the "inland passage." It passes east of Vancouver Island, and between a long chain of islands fringing the coast and the mainland. The route is shown on the map by a dotted line among the islands. So smooth is this route that not one of the party was sea-sick. The scenery was beautiful and ever changing. They through narrow chan-

nels, where there was hardly room to pass another vessel, under the shaded peaks, and in full ows of great view of snow-capped mountains. At every few miles on this remarkable trip, mouths of inlets and channels were passed, which led away into the mountains beyond, and which have never been surveyed except by the savages, whose occasional canoe moves over these waters in quest of salmon.

The fourth day the "Queen" steamed into the lovely harbor of Fort Wrangell. Here everybody went ashore to see the Alaskans in their homes. They found the houses of this Indian village to stretch along the beach in a long row. They were built of cedar and pine planks, roofed with planks

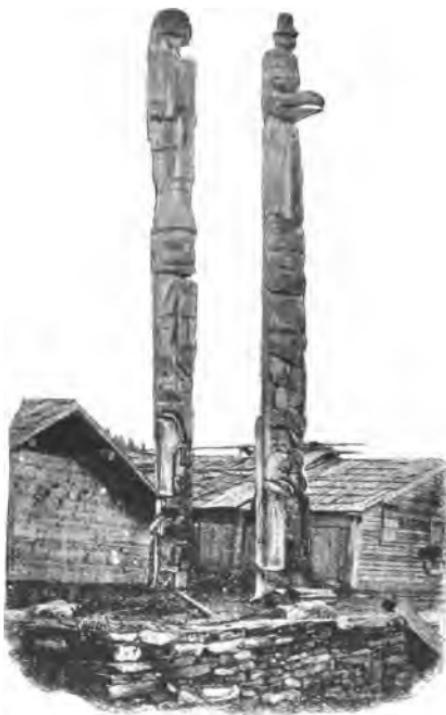


ROUTE TO ALASKA.

and logs. Each house contained one large room, which is used by a number of different families.

"What are those poles placed before each house?" Nellie asked.

"Those are the 'totem poles,'" replied her father. "They are the family tree, and they have carved upon them the different crests of their ancestors. The raven, the wolf, the whale, and the eagle seem to be the favorite emblems. I should think some of them were fifty feet in height."



TOTEM POLES, FORT WRANGELL, ALASKA.

When the party returned to the steamer, they were well loaded with curiosities which they had bought of the Indians. Some had carved spoons, carved wooden trays and bowls; others brought big garnet crystals and silver bracelets.

A few miles above Fort Wrangell, the "Queen" entered Prince Frederick Sound, which the captain considered one of the most beautiful parts of the trip. Here the mountains of the mainland ran down abruptly to the water. At one time

the ship was in a lake, then it seemed to be in a river, and by and by in a canal, with walls towering above on the right and left to dizzy heights. Yet no sail or boat was seen upon this vast expanse of water. Stillness reigned supreme, except when it was interrupted by the screech of an eagle or the flight of ducks disturbed by the approach of the vessel.

"Mr. Cartmell," asked the captain, "what is your pleasure, — to go to Sitka first, or to Juneau and Glacier Bay?"

"To Juneau."

Orders were then given to pass to the east of Admiralty Island, and soon they began to meet large pieces of floating ice from the many glaciers in the vicinity.

Miss Gray asked the captain about the flowers of Alaska.

"I have seen here many kinds, such as grow in New England. I will send you ashore on one of the islands, where you can gather a nosegay."

The captain was as good as his word, and Miss Gray went in the boat to a small island, and returned with a good-sized bouquet, which George photographed.



FLOWERS OF ALASKA.

The next morning the Cartmells were aroused at quite an early hour by the firing of a cannon on the steamer. This was the captain's way of calling them. Getting up, and appearing on deck, a view met their gaze which they will never forget. The steamer was in a mountain-locked inlet, or fiord, walled in by lofty cliffs of black granite. In front of them, not far away, Taku Glacier, a mighty river of ice, reared its awful head fully three hundred feet high. Ice was constantly breaking away from the main mass with a noise like that made by artillery, and dropping into the water.¹ It was difficult for them to leave these entrancing sights; but the captain seemed to be in haste.

A few hours' sail brought them to Juneau. A day was spent in this vicinity. Juneau they found to be an active, stirring place of business and trade. It is in the midst of rich placers and out-cropping gold quartz ledges. It is built upon a small plain at the foot of high mountains which form a dark background as one approaches the place. They saw numerous houses here, and hundreds of miners and Indians. They found the Indian women keen traders, and sharp at selling curiosities. The place boasts of one horse and carriage.

The Indians in summer go off in great parties to catch a winter's supply of salmon.

In the afternoon Mr. Cartmell ordered the captain to take them all over to Douglas City, Juneau's rival mining town, on Douglas Island, a few miles west of Juneau. This island is a famous place for hunting, but it is more famous for possessing the Treadwell gold mine, with the largest stamping mill in the world. As they approached

¹ See Frontispiece.

the town in the steamer, they could hear the noise of the machinery in this great mill. They went first into the room where the huge hammers crush the ore; then into another room, where the ore is washed in tank after tank lined with mercury, to hold back the gold. Afterwards they saw how the gold is separated from the mercury and



THE NORRIS GLACIER, TAKU INLET, ALASKA.

made into solid gold bars. Mr. Cartmell and George went through a tunnel into the mountain, and saw them use drills driven by compressed air to get the quartz ore out. Returning to the mill, Mr. Cartmell asked the superintendent how much gold they extracted in a year.

"We are now running day and night, and we expect this year to take out one and a half million dollars' worth. The ore, you know, is low grade, averaging only ten dollars to a ton."

About five o'clock the "Queen" again turned her prow

northward towards the land of glaciers. As they were so far north, nearly 59° , it was not dark till ten o'clock. About eight o'clock in the evening they were in sight of Eagle Glacier, in Lynn Channel.

"See, Papa, another frozen river!" cried Nellie.

"It looks, Mamma," exclaimed Florence, "like a frozen cataract."

"To me," said her mother, "it resembles another Niagara, frozen and motionless."

"It is said to be twelve hundred feet in height," remarked Captain Carroll.

"Rainbow Glacier I consider more picturesque than Eagle. When the sun shines upon it, the ice flashes, and shows all the hues of a rainbow."

The farther north they went in Lynn Channel, the more floating ice they encountered, and the loftier and more beautiful the mountains on each side became. Miss Gray said the mountains reminded her of the lines: —

"Ye are the things that tower,
Whose smile makes glad,
Whose frown is terrible."

The next morning the "Queen" was anchored off a still larger glacier than any before seen. Captain Carroll, after breakfast, led them to the upper deck, and pointing to the great ice river, said,—

"This is my favorite glacier. It comes down like a great river from those lofty mountains. See how it fills the valley, and then, after passing through the narrows, spreads out like a fan when the side pressure is removed."

"How wide is it?"

"About three miles, and twelve hundred feet high at the Narrows."

"It reminds me," said Miss Gray, "of the Rhone Glacier."

"What is it called, Captain?" Fred inquired.

"It is called the 'Davidson Glacier,' after a noted astronomer. It is like, in shape, the 'Norris Glacier.'"



MUIR GLACIER, ALASKA (SIDE VIEW).

While this conversation was going on, George had taken a picture of the glacier from the steamer; after which the captain took them all ashore, and they ate their dinner at the foot of the wall of ice. In this channel and elsewhere the children saw how icebergs are formed. Every few moments blocks of ice fell off from the end of some glacier and dropped into the water. Some of these were huge in size, and when they fell, the noise was like the booming of many cannon. They made great masses of floating ice which could very properly be called "icebergs."



THE FACE OF THE MUIR GLACIER.

The next day they were sailing up another similar channel farther west, called very appropriately "Glacier Bay." Here the "Queen" encountered a sea of ice extending for miles and miles, and it was with some difficulty that the captain could find a safe passage through it. At last he reached a good position, and Captain Carroll said, "Behold the Muir Glacier."

The steamer was anchored about a mile away; and yet, as some of the great blocks of ice fell into the sea, they sent up dense clouds of spray, and caused billows to rock the "Queen" quite violently. Captain Carroll told of a party which once encamped too near the front wall of this glacier, and were washed away by a wave caused by the falling of a huge berg.

"How blue it looks,—blue as the sky!" exclaimed Nellie.

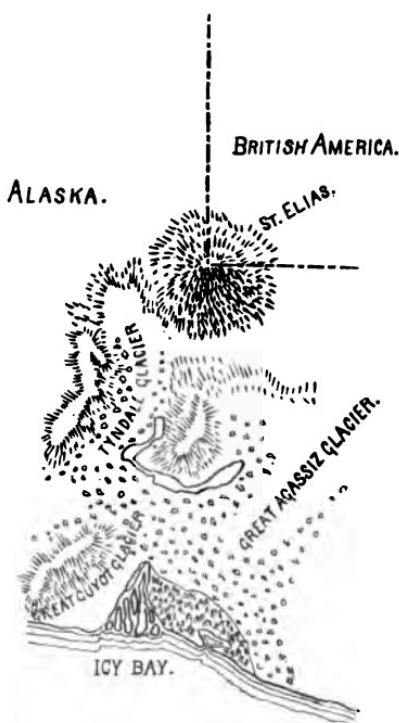
"That color is very common," said the captain.

Fred, in his diary, thus described the Muir Glacier:

"Glacier Bay is about one hundred miles northeast of Sitka. This glacier is named after Professor Muir, the Pacific coast geologist, who was the first white man to visit the place, in 1879. Captain Carroll took us all over to the glacier in the row-boat. We found the front face of ice from two hundred to four hundred feet in height. According to Professor Muir, it extends back from the bay forty miles, and it is formed by the union of sixteen other glaciers which come down from the two mountains,—Fairweather and Crillon."

While in Glacier Bay, a family of natives visited the steamer, and George secured their pictures by giving them a few simple presents. They lived largely upon fish, and were dressed like the Esquimaux.

"If the children will gather round me," said Mr. Cartmell, on their way to Sitka, "I will tell you a little about the general aspect of this country."



MAP OF ST. ELIAS.

"Oh, do, Papa!" they cried.

"It is a general law, in reference to highland regions in different continents, that the principal ranges of mountains are usually parallel to the coast. This is



NATIVES LIVING NEAR THE GLACIER.

especially true in Alaska and British Columbia. The Rocky Mountains and the Coast Range follow the coast, separated from each other by a plateau sloping in the southern part to the south, and bearing to the ocean the Frazer River, but sloping in the northern part towards the Arctic Ocean and Bering Sea, and producing the great Yukon.



MOUNT ST. ELIAS, ALASKA.

"These parallel mountain ranges differ, however, in height. The Rocky Mountains decrease in height as they approach the great northern sea. The Coast Range gradually grows higher and higher, till a few miles north of our present locality. Here this range sends down the great Muir Glacier from a height of fifteen thousand feet. Then, thirty miles farther to the north, Mount Cook, sixteen thousand feet high, looks up to Mount St. Elias, about eighteen thousand feet in height. But the climax is not quite reached yet. Mount Wrangell, on Copper River, twenty-five miles farther away, is considered by travellers two hundred feet higher. From this great summit the range bears away to the southwest, and

sinks lower and lower in elevation as it passes through the various Aleutian Islands. As fast as the peaks become lower, the ocean becomes deeper around these islands, indicating that these stepping-stones to Asia may have gradually sunk from their former position more and more into the sea.

"Mount St. Elias is situated partly in the United States, and partly in a corner of British America. Imagine Mont Blanc placed close to the sea-shore, with its whole height visible as measured from the sea level. Then imagine Mount Washington placed upon the summit of Mont Blanc: the total height would about equal St. Elias, according to the Coast Survey's recent estimate. St. Elias stands on a broad base, from which it rises, like an Egyptian pyramid, straight, regular, and massive, from an icy plateau of very extensive glaciers. It seems to rise thus out of the Pacific Ocean with a single leap, when seen from Icy Bay, some twenty miles from the coast."

"Has Alaska any large rivers?" George asked.

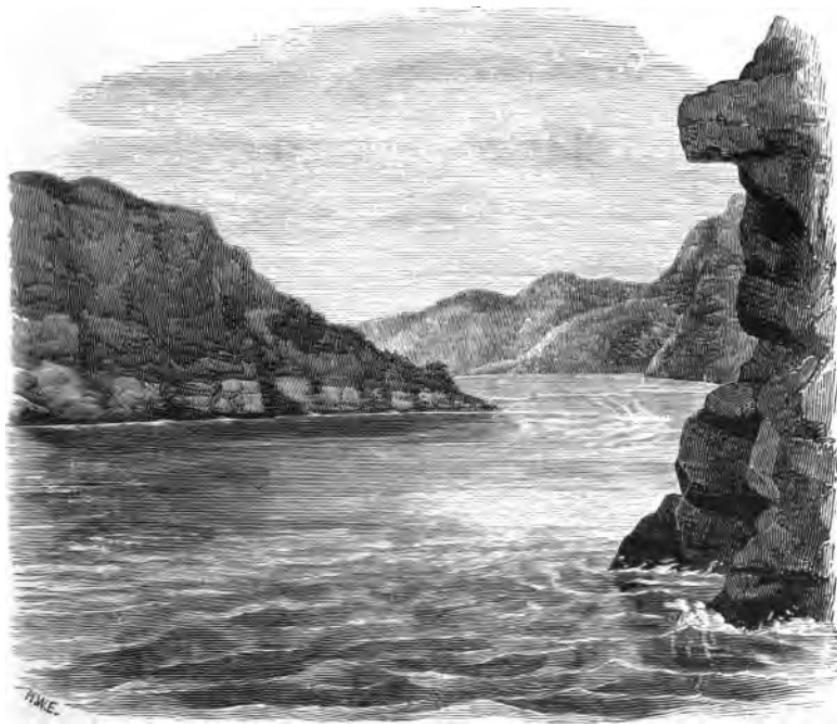
"Yes; it has one very large river, which flows into Bering Sea. The slope of the country is such that a river nearly two thousand miles long can rise in two lakes within forty miles of the coast. The possibility of this can be seen by looking at this map of the country. You see the river is semicircular in its course, the arc bending to the north like the Niger, in Africa."

"Are there noted falls in this river?"

"None of importance."

"At one point the Yukon narrows from three miles in width to half a mile, and the rocky hills rise sharply from the water. The current is very rapid, and it has

here worn away the granite on either side. Even the Indians have difficulty in overcoming the strong current, and rowing in their birch canoes up the river. A steamer would have no great trouble here."



THE RAPIDS ON THE YUKON RIVER.

LESSON VIII.

THE CARTMELLS IN ALASKA.

Second and Third Weeks.

THE next morning, about ten o'clock, Captain Carroll brought his trim steamer into **Sitka** Harbor. The approach to the capital of Alaska is quite picturesque, as the harbor contains a number of pine-covered islands, and lofty mountains form the background. While they were slowly passing towards the dock, Miss Gray said to the children:—

"Although Sitka is on a parallel with the central part of Labrador, skating is rarely enjoyed, for the curious reason, — want of ice. St. John's, Newfoundland, is ten degrees, or seven hundred miles, farther south, and has its harbor frozen solid every winter, while Sitka has always an open roadstead.

"The climate is warmer than that of Boston, the average for the year being 43° . Only in four years out of forty-five did the thermometer fall below zero. The cause of this is the Japan current.

"The amount of rain in Sitka is about double the average downpour in New England. It is the wettest place in the North Temperate Zone in North America. But, strange to say, with all this rain it is not damp so as to cause things to mould."

The "Queen" was secured to the wharf, and continued for a few more days to be their floating hotel as well as home. After dinner all went forth to see this wonderful little town of the North. It did not take long to get a general view of the place. The custom house,



SITKA.

the barracks, and the Governor's castle formed a group of public buildings on the right of the landing.

A gravelled road led from the wharf, "up town," as far as the Greek Church, built by the Russians years ago. It is quite plain upon the outside, but contains within some interesting things, such as the bishop's mitre, almost covered with precious gems, sacred vestments, and a few paintings.

"How large, Papa, do you suppose the place is?"

"There are, I believe, over one hundred and fifty

houses, and about twelve hundred inhabitants, more than half of whom are native Indians. Sitka was once the headquarters of the Russian-American Fur Company. The solid log warehouse occupied by this great company is now devoted to the work of the mining-engineer and assayer, showing that minerals have taken the place of furs in business importance."



A STREET IN SITKA.

The next day Mrs. Cartmell and Miss Gray visited the great attraction of Sitka,—the promenade along the beach and through the woods to the banks of the Indian River. A part of these grounds was laid out by the Russians, and a part by the United States sailors from one of the naval vessels.

Mr. Cartmell and the children visited the cemetery, and near by the old stockade, where there is a remarkable Indian village with a double row of houses facing the beach. Each house was numbered and whitewashed. Gravelled streets were laid out, and neatness and order

seen everywhere. This was brought about by the captain of the man-of-war fining each disorderly Indian in blankets, and locking him up in the guard-house. The Cartmells learned that sometimes nearly a thousand



INDIAN MAT-MAKERS, ALASKA.

Indians were in the village, when most of them came home from fishing and trading trips.

The richest Indian was Mrs. Tom, said to be worth ten thousand dollars. She made this money by her ability in trading among the neighboring islands. She was a plump matron, strolling about barefooted, but wearing blue ribbons and many bracelets. Her house was a model of neatness and good order. Going home, the boys found a family of Indian mat-makers, and bought some fine mats.

When Mrs. Cartmell and Miss Gray returned from Indian River, they called at the Mission School, where they found the girls were being taught to sew and cook, and the boys were learning all sorts of manual work,



INDIAN.

— from carving to engineering. In describing the visit, Miss Gray said:—

“It was an interesting sight to see a roomfull of Japanese-looking Indian girls. They appeared very sweet and lovable in their clean wash-dresses and aprons. The boys were dressed in their school uniforms. The manners of both boys and girls were as good as those in Eastern schools.”

Captain Carroll came into the saloon in the evening,

and answered many questions asked by the children in reference to the Alaska Indians.

"The Indians in Alaska resemble in many general respects the average North American Indian. Like him, they are frequently ignorant, bloodthirsty, lazy, and immoral. They resemble somewhat the Mongolians, and their appearance suggests that they came originally from Asia.

"A Fort Yukon Indian likes bright colors, blue and red being favorites. He allows his hair to grow to its



NOSE ORNAMENT.

full length. He parts it in the middle, and smears each lock with grease and red ochre, powdered with swan's down cut up finely. He wears an ornament made of dentalium, about three inches long, put through the nose. Necklaces are often worn made of bears' claws and teeth, sable tails, wolf ears, dyed porcupine quills, and beavers' teeth.

"The Sitka Indians have broad, flat faces, large shoulders, chests, and arms, the result of so much practice with the paddle. They shamble in their gait, and toe in considerably. But when the smartest of these Indians become civilized and dressed up like Americans, they no longer look like Indians."

"What do these Alaska Indians eat, Captain?"

"They eat smoked salmon, with oil, and drink very strong tea. They like clams and mussels, and the devil-fish is considered a great dainty; but they seldom touch

wild game, although very expert hunters. Dried salmon-eggs is another favorite dish."

"What is the condition of the women?" Mrs. Cartmell asked.



CIVILIZED ALASKAN INDIANS.

"The women here have great influence and authority. They are all keen, sharp traders, and often break up a bargain made with the husbands, by objecting to their selling, or insisting upon charging much more for the article."

"How do the real native Indians live, Captain Carroll?" Fred inquired.

"A native village in Alaska is composed of half-a-dozen houses and a dance-house, all built in a rather



NATIVE INDIAN HOUSE, ALASKA.

peculiar fashion. Each house is ten or twelve feet square, built of spruce logs. These logs are placed so that the house will be at least half underground. In winter it looks somewhat like a big snowdrift.

"The roof has a square opening in the centre for the escape of smoke and the admission of light. The entrance is a small hole connecting with a passage-way which opens under a shed at the surface of the ground.

This is necessary to keep out the cold. The fire is built in the middle, under the opening in the roof. The earth is covered with straw or spruce branches. The beds are made of deer or rabbit skins, which are folded up and put away in the day-time."

"How do the Indians here travel in winter?"

"The Alaska Indians travel in winter largely on snow-shoes; in fact, it is impossible to go long journeys in



INTERIOR OF INDIAN HOUSE, ALASKA.

hunting or trapping without the help of these shoes. The shoes vary somewhat in shape and size. Four kinds are commonly used."

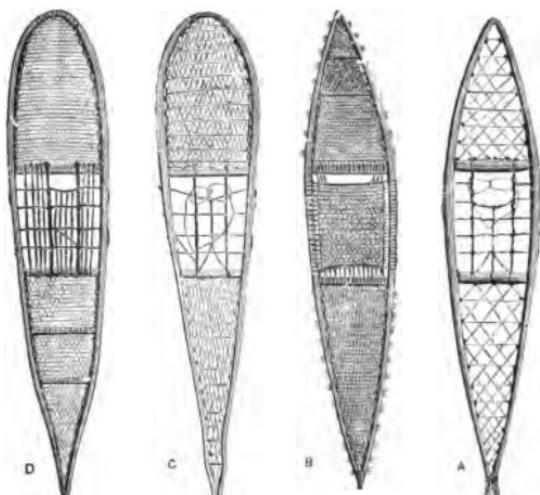
"Do these Indians have good canoes?"

"The Indians do not, but the Esquimaux have two kinds of boats. The larger one is open and flat-bottomed. The frame is made of wood, tied with sealskin thongs. The skins of the seal, oiled and sewed together, are stretched over the frame, and held in place by lines made of walrus skin. Such a boat will carry a number of persons, and it is called by the same name, *oomiak*, in Alaska and in Greenland.

"A smaller boat, used for one person, is like the Esquimaux *kyak*, and called by the same word. When

at sea, the occupant wears outside of his clothes a water-proof shirt, which is tied around the projecting rim of the hole in the top of the boat, and thus keeps out every drop of water."

"On our way back, please tell us, Miss Gray, about the fur-trade."

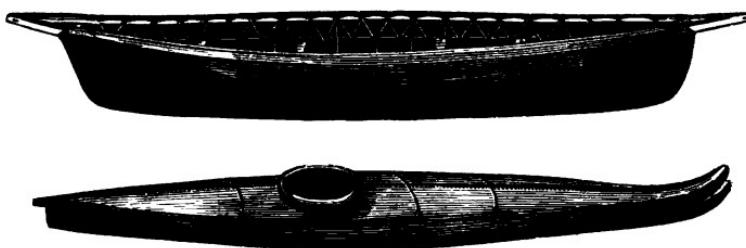


SNOWSHOES.

"This cold and inhospitable country was explored at first for the sake of the furs. These are of two kinds,— land furs and sea furs.

"The beaver is found all over Alaska. Among the Yukon Indians it is the standard of value. A beaver skin is worth twenty musket balls, or two fathoms of string beads. A double-barrelled gun is worth ten beaver skins. Black and silver foxes are abundant, and a good skin is worth fifty dollars. The mink is caught in great numbers at the mouth of the Yukon, and it sells for five balls.

"The fur-seal fishery is now confined almost entirely to two islands, named St. Paul and St. George, in the Pribylov group, situated in Bering Sea, northwest of the peninsula of Alaska. The seals leave these islands



BOATS.

in November for a trip to the sunny South. Their position during this journey is indicated by the month printed on the map. They return to these breeding islands in June. The young pups are born blind, like young dogs, and remain so for several weeks. When they are three or four weeks old, they are taken by the mothers into the water, and taught how to swim. After this the pups spend most of their lives in the water.

"They are easily tamed, and are taught to perform a variety of tricks showing great intelligence.

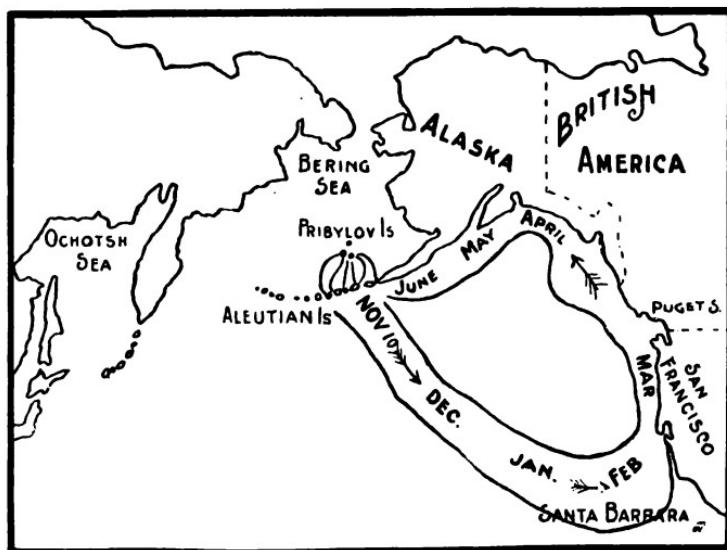
"Trained seals are often exhibited in the large cities. They live mostly on the squid, or cuttle-fish. Their hearing is very acute, and so they are difficult to catch by any of the usual means employed by the Esquimaux.¹

"The eyes of the seals are black, and large for an animal which averages about six feet long. When pups, the hair is black; but at nine months of age this hair is

¹ See Fourth Book and Second Book.

replaced by a stronger hair, tipped with white or brown. Seals sleep in the water, on their sides. They have three cries, — a kind of roar when angry; a milder cry when calling to one another; a piping whistle when they are tired."

"When do they come northward?"



MOVEMENTS OF THE SEALS.

"In May and June they come from the warmer South to these two islands, and rush ashore in great droves containing thousands, making sometimes the hillsides black with them. They can ascend quite perpendicular rocks. The female seal has a shorter tail, and more brown on her body than the male. The male has a mane like the lion. Sometimes they are seen on these islands sitting on the land with the head bent forward,

fanning themselves, when it is warm, with one hind flipper.

"The right to kill seals on these islands is farmed out to some company which pays a large sum to the United



SEALS.

States for the privilege, and the number it can kill in one year is restricted. The hunters get between the water and the animals, and then shout and wave their sticks. The seals, being timid, do not dare rush for the water. A body of about four hundred are thus separated

from the rest of the herd, and then they can be driven by two men into the interior of the island, just as a shepherd drives a flock of sheep. Every two or three minutes they are allowed to rest. If any become too



tired to go farther, they are immediately killed by a blow on the back of the head with a heavy club. No guns are used in killing, as this would make a hole in the skin.

"When the herd have been driven to a suitable place, they are killed one by one, and the skin immediately taken off. The ears and tail are left with the skin. The skins are salted as they are piled together. When sufficiently cured, they are bound up and shipped to London to be dyed and dressed."

LESSON IX.

FROM SEATTLE TO MOUNT SHASTA.

AFTER returning from Alaska, Mr. Cartmell and his family spent several days in quiet rest. Two of these days were enjoyed at Seattle. The boys could not stay indoors, and so they rode about the city in the cable and electric cars. They soon learned that the city is a natural curiosity as to situation. It rises in a succession of terraces, height above height, from the shores of Puget Sound. It is all up and down, whichever way one may go, and the site of the city has much the appearance as if the land had stiffened into its present shape during some tremendous upheaval. It is a confusion of hillocks and hills of varying size, making walking difficult and carriage riding tedious, — the despair of street surveyors, and a boon to cable and electric car lines. It is often called a "City of a Hundred Hills."

They also learned that the city is growing rapidly; that it has now many fine streets, containing substantial stone and brick blocks, churches, schools, and various public edifices; that the harbor is deep, and ample in size; that the lumber business is important; and that a wide area of coal-fields is situated within thirty miles.

Four more days were spent in Portland, Oregon. This city was found to be a seaport, although one hundred

miles up the Columbia River, and twelve miles more up its tributary, the Willamette.

The Willamette is deep enough to receive the largest ocean steamers. Few cities in the country are more beautifully situated. Green wooded hills enclose it on the west, the river flows through the city towards the north, and to the east, fifty miles distant, the picture is framed in by the Cascade Range and several giant snowy peaks. Mount Hood and Mount St. Helens, covered with eternal snow, are seen on clear days while the observer is shopping on the streets.

One day the boys and their sisters enjoyed an excursion *down* the Columbia River. From the deck of the steamer the snow mountains were visible in ever-new groupings. On this trip the children learned about the salmon industry, managed largely by Chinamen,—millions of dollars being invested in the business. So many fish are yearly caught during the legal season—from April to July—that there is great danger of killing the goose (or fish) that lays the golden eggs.

A few days later the whole family took a trip *up* the Columbia River to the Dalles. This river flows for a long distance between the States of Oregon and Washington. At first our travellers were delighted with views of Mount Hood, life-size, from top to base. For an hour the steamer continued straight towards the mountain, and then all at once changed its course, leaving the peak to the left. Giant boulders, vertical walls of bare rock, natural fortresses, numerous high waterfalls, follow one another so rapidly that not a moment was wearisome or monotonous. Much of the scenery was like the Hudson, but far more imposing.



MOUNT HOOD.

The day-boat from Portland stopped at the Lower Cascades, and the party transferred themselves to the train, which connects with the upper boat, six miles distant. The Columbia River is here narrowed to a quarter of its regular width, and good views of the rapids were seen from the car windows. The water rushes by in dizzy leaps and foaming waves. The views on the upper steamer were grander than on the lower part of the trip. At the end of the Highlands the mountains rise in great terraces, one, two, and three stories high. As Mr. Cartmell and his friends ap-

proached the town of Dalles, which means "Swift Water," Mount Hood once more surprised them by emerging away to the south as imposing as ever. The return trip was equally pleasant.

Several short rides around Portland were taken. The driver told the children about the abundance of berries in Oregon. "We have," he said, "in their season, delicious wild strawberries; they are so abundant that they perfume the air. Blackberries are more numerous. Wild currants, red and black raspberries, gooseberries, and many other kinds of berries are found everywhere. This is owing to our climate."

"What is peculiar about your climate?" George asked.

"It is very humid, and not only produces abundant berries, but fields of plump and firm grains of wheat, and extensive forests of valuable lumber."

In the journey from Portland through Oregon the travellers saw, in the Willamette Valley, a country devoted to grain, sheep, and cattle. Away to the east, Mount Hood, white as marble, was seen. In another direction rises Mount Jefferson, much higher than his namesake in the White Mountains.

In order to pass from the Willamette Valley, in Oregon, to the Sacramento Valley, in California, the Cartmells were obliged to cross once more the Cascade Range; but this time in a southerly direction. The second day they began to climb the mountains. The great pleasure of seeing mountain-scenery never wore away. Up, up, their train takes them, passing between a heavy growth of Oregon firs, tall, light, and graceful as an Indian arrow. Higher and higher they rise, terrace above terrace, each terrace cut by a gulch, and

each gulch spanned by a web-like trestle, over which the train passes in safety.

Here, as well as in many other parts of their Western tour, they rode by, or through, the typical pioneer town, consisting of one street. On each side of this street several roughly made buildings with high-pitched roofs are placed closely together. In some cases it was a



FRONTIER TOWN.

lumber settlement; in other places it was a mining town, young in years, but full of life.

Finally, the summit of the Cascade Range was reached, near the State line, and the extra engines detached. Then the train plunged into a long tunnel, and emerging therefrom, began to descend by a zigzag course towards the Sacramento Valley. After Sisson was reached, eighty miles from Oregon, Mr. Cartmell and

the boys remained for a week's hunting, which is described in the next chapter.

The scenery about Sisson is grand beyond descrip-



MOUNT SHASTA, CALIFORNIA.

tion. Four or five lofty peaks rise about the place; but among them all one mountain is monarch. Mount Shasta, as shown in the picture, sublime and majestic, rears among the stars its awful height from its massive base.

LESSON X.

HUNTING IN THE ROCKIES.

IN the last chapter we left Mr. Cartmell and the boys at Sisson. They at once made the necessary preparation for a **week's sport** in this paradise for hunters. The preparation consisted in hiring a competent guide and a good cook, who supplied tents, food, several mules and burros, or donkeys, fishing and hunting tackle, etc.

The first day they all marched away from the railroad into the wilderness, about fifteen miles. Here they pitched their tent, and began the new life.

The cook and Fred went off at once to catch enough trout for supper and breakfast. The guide took care of the horses and pack-mules, picketing them where the grass was abundant. Then he directed George and his father how to put up the tents and start the fire. Within less than an hour, Fred and the cook came back with plenty of mountain-trout. Mr. Cartmell noticed that a California trout differs in appearance somewhat from the New England variety. Its back was a bright olive-green, and its sides like the purest mother-of-pearl.

After supper the guide told hunting-stories as they sat around the big blazing camp-fire. George asked him about the smaller game, and he said: "Gray squirrels abound here; quail are found everywhere. Grouse are found in the highest mountains; wildcats are fre-



FISHING IN THE ROCKIES.

quently seen. The coyote is altogether too common for the comfort of the farmer, as he will eat anything, from a watermelon to a sheep. Rabbits do so much harm that the people sometimes drive them into a corral, and kill thousands of them in a day."

Before retiring to sleep, the cook was asked to guard the animals from bears the first half of the night, and Mr. Cartmell offered to do so the last part. The boys slept as they never had before, being nearly four thousand feet above the sea. They were ready at an early hour for breakfast. Then the animals had to be packed for the second day's trip. Fred was greatly interested in this operation, and described it in his diary.

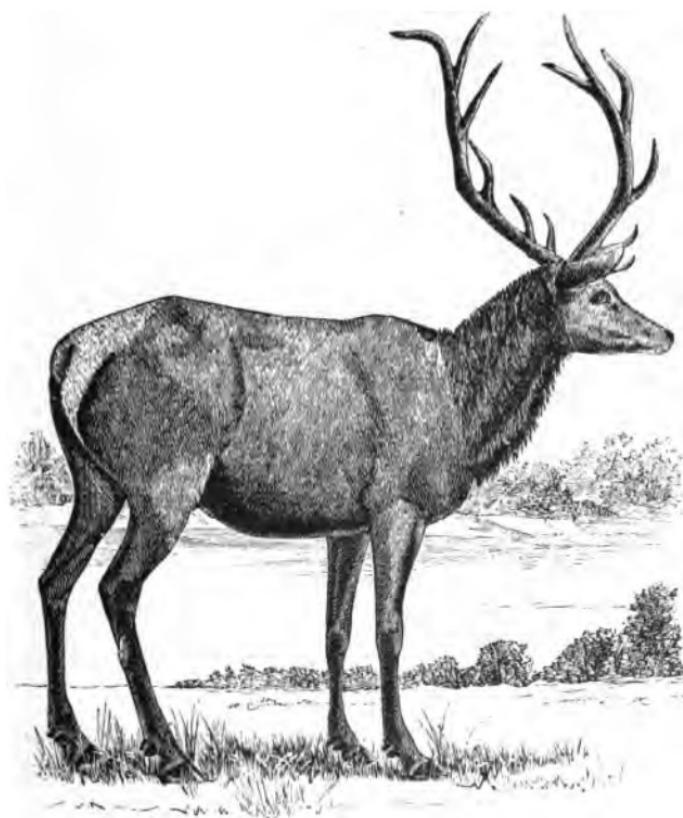
The second day the guide led the hunting-party farther away from all signs of roads and civilization. A beautiful spot was chosen for a camp in a small park, beside a splendid trout-brook. Here a more permanent camp was made, and the horses and mules were allowed to feed for a while without being tied.

The next morning Mr. Cartmell, George, and the guide started on foot for higher elevations and more remote regions among the Cascade Range. They packed on their shoulders blankets, food, a frying-pan, and a coffee-pot. In their hands they carried their rifles, and Mr. Cartmell had his pocket-compass. All day they travelled, and at night, wrapped in their blankets, slept at the foot of a big cedar.

The next day the guide began to see signs of deer, and in a short time they heard the welcome sound of crackling branches. Then the guide told them how necessary it would be to go forward very carefully.

All three now began slowly to crouch and crawl nearer

the sounds. In half an hour they were rewarded by seeing a dozen elk feeding together in a mountain-glade. One carried an enormous head; two others had smaller,



WAPITI, OR ELK.

but imposing antlers. After watching them, all unconscious of danger, browse around, the guide gave the signal, and the three rifles were fired at once. The monarch of the herd and one of the smaller stags fell

to the ground. The others fled so quickly, no one had a chance to fire a second time.

"How can we get them home?" George at once asked.

"I doubt if we can," said his father.

They skinned the two animals, carefully preserving the antlers; and these were finally sent to Lake View as suitable trophies of the hunt. The guide cut off an ample amount of deer-steak, which lasted till their return to camp. On their way back, George asked the guide about the *bighorn*, or mountain sheep. He said, —

"Unlike the antelope, he makes the lofty mountains its favorite abode. In summer, it seeks the highest mountains; in winter, it comes down to the lower spurs, or foot-hills; but it rarely leaves the rough, hilly, broken land for the plains.

"Few creatures are more difficult to approach than is the bighorn; for, like all mountain animals, it is exceedingly keen of scent, very vigilant, and so cautious it carefully overlooks a country from an elevated standpoint ere it presumes to advance towards it. I never shot but a few of them."

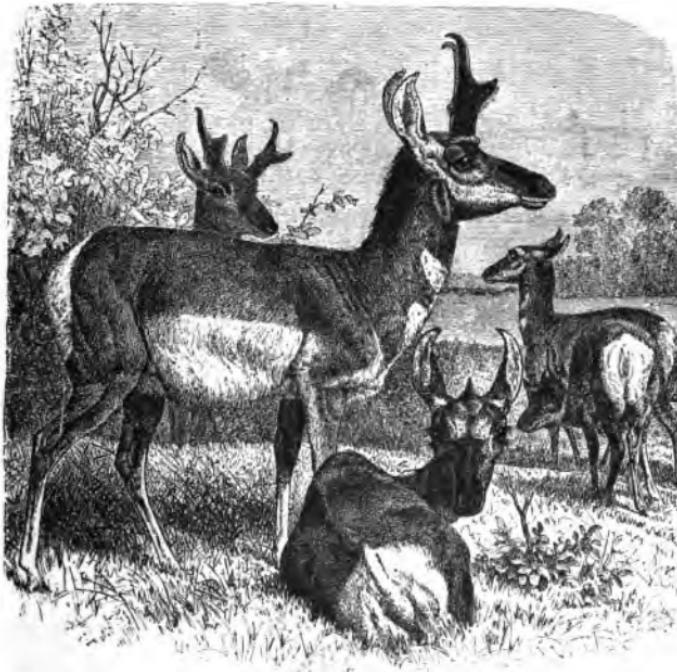
When George reached camp, he at once sought out his brother, and they exchanged news.

"What have you been doing, Fred?"

"Fishing and hunting, eating and sleeping. The first day we went troutting, and I had famous luck. The second day the cook and I went off to a quiet valley, where we found plenty of pronghorns away from the trees, feeding on the grass. They were so graceful and beautiful I was ashamed to shoot them, till I thought of the need of meat for dinner.

"We stalked them very easily by displaying and gently

waving in the wind my red silk handkerchief. Soon some of the antelopes, or deer, noticed the color, and slowly and cautiously approached till we fired; and each one brought down his animal. I was so proud I am going to mount the horns to keep."



PRONGHORN DEER.

"Did you have any other excitement?" George asked.

"Yes; we saw yesterday a *grizzly bear*."

"A live one?"

"No. A party of hunters came near the camp, and I saw the huge creature, which they shot the day before yesterday."

In the evening the boys questioned the guide about this special Rocky Mountain beast. He told them the following facts and anecdotes:—

"The grizzly bear ranges through the Rocky Mountains, from Mexico to British America. In size, strength, and ferocity, it is the monarch of the American world, if not of the whole earth. Those who called the lion the king of beasts knew nothing of the courage, ferocity, size, power of endurance, and tenacity of life of the grizzly. The lion would be a light weight in a match with a grizzly bear, who often weighs thirteen hundred pounds, nine hundred pounds being about an average.

"The grizzly bear is not a graceful, well-proportioned animal, like the lion, but thick-set, with a short neck, massive jaws, thick and powerful legs, large, broad feet, and long, sharp claws, which will cut like a sabre. The presence of this giant is known long before it is seen, by the enormous size of its footsteps. It has been known to kill two buffaloes by strokes of its huge forepaws. It can kill a man with one fair blow, or crush him like an egg-shell between its forelegs.

"When surprised, it rises with a deep gruff, bass-drum-like 'huf, huf,' and usually charges vigorously. Notwithstanding its clumsy form, it can run rapidly, owing to its great strength. And woe betide the man who cannot then find a tree convenient. That is his only refuge, if he is alone, as the grizzly cannot climb,—owing to the form of its claws, the Indians say. Its enormous weight is more likely the true reason.

"Great and powerful as the grizzly bear is, it is very much afraid of the human voice, and often flees from

it. It has been known to turn tail and run, on hearing the terrified screams of a man. A woman in California once caused a female grizzly and her two cubs to beat a rapid retreat by shouting lustily at them.

"One day a miner near the Wind River Mountains was suddenly startled out of his wits by the muffled



A GRIZZLY BEAR.

roar and charge of a grizzly bear. Not knowing what to do, he fired at the animal, and then ran. As the bear was closing on him, he sought safety in the first tree he met, which was a young fir. The bear then com-

menced a regular siege of the tree. The young man went up the tree so quickly he left his rifle at the foot.

"Towards evening he began to get hungry, and tried to hasten the departure of the bear by trying to hit him in the eye with cones. Having used up all the cones in his reach, he tried to get others, when one of the branches on which he was standing gave way suddenly, and let him fall with lightning speed. He thought, of course, it was all up with him; but he fell plump on the bear's head, which so terrified the bear that it fled with the greatest speed."

"Did you ever shoot a grizzly bear, Mr. Guide?"

"I have assisted to do so several times. The last time I saw one was a year ago, in Wyoming.

"While riding towards a frontier post, my comrade and myself espied a bear near some cotton woods. On seeing it, we dashed forward on horseback, firing. But our bullets evidently went wide of the mark; for instead of attempting to run away, it raised itself on its hind-legs, as if it were willing to face all possible foes. The attitude was so funny I was forced to laugh; but my companion could not see the joke. But he did see a good chance for a shot, and fired. The bullet this time evidently took effect, for the bear moved off at a rate of speed that surprised me.

"We started in pursuit, and kept firing at its back and head. Then we rushed past it, one at a time, and delivered two shots in rapid succession at its sides. These movements were repeated till our revolvers were empty. The animal had staggered three or four times, charged twice, and fallen once while the firing went on. It finally halted, one of its shoulders being broken. This was the

opportunity we wanted; so, taking deliberate aim at its head with our rifles, we fired, and it fell dead in its tracks.

"An examination proved that it had eight bullets in it, one of which was in the heart, one in the fore-shoulder, two in the skull, and the rest scattered over the body. We found it to be a full-grown male. The grizzly bear is so difficult to kill, it is never wise for a man to attack it alone."

During the hunting trip the boys learned a good deal about the habits and actions of Western mules when used as beasts of burden. When let loose to feed at night, it is no easy matter to catch them in the morning. After they are caught, it is a much more difficult matter to load them and keep them loaded.

George thus described the operation:—

"A man stands on each side of the mule to be operated upon; the saddle is placed on the back and securely girthed. The side packs are then lifted into position on each side of the saddle and tightly fastened; other articles are placed in position, a tent is thrown over all, and the load is ready to be secured.

"This is done by a rope passing over these various articles, as on a furniture wagon, and under the animal. Each man places one foot against the pack or the animal's ribs, and throwing the whole weight of his body into the effort, hauls with all his strength upon the line. At each jerk the wretched mule expels an agonized grunt, snaps at the men's shoulders, or gives them a sharp pinch. Still the men haul with a will, and at last the rope is made fast.

"While No. 2 is being tied up in a similar manner, No. 1 perhaps is rolling over and over, throwing all four legs into the air,—greatly to the damage of the various articles on his back. No. 2, after being finished, runs with his pack between two trees which are near enough to hold the pack and let the mule

back out and free himself. While this one is being repacked, others, maybe, are squealing, and kicking one another as if they never expected to have another chance of kicking in this world.

"At last things are all arranged and fixed. 'Old Billy' goes ahead, for the mules know him, and will follow him anywhere. All goes well for a while ; then the hindmost animal tries to pass to the front. A tin bucket begins jingling on his



GAME KILLED.

LOADED BURROS.

articles in the pack rattle and shake against his ribs. A panic seizes him, and, wild with fright, he breaks into a mad gallop. The pack begins to slip over his tail, and soon is scattered along the road. Then the articles must be gathered together and repacked on the same mule.

"Not all these accidents happen every day, but some of them or similar ones try the patience of those who travel long distances over rough paths, where roads for wagons do not exist."

In about a week the boys and their father returned to Sisson from the pleasures of hunting and camp-life.

back ; he gets frightened at the noise, and breaks into a canter. The bucket bangs from side to side ; all the small

They brought back with them something to show for their time and sport. Some of the meat was packed in ice, and taken with them on the train to the Golden Gate, where the rest of the family enjoyed "wild game" for a few days.

LESSON XI.**LUMBERING AND FARMING.**

WE have already learned what the boys did in their hunting trip; now we follow the ladies and girls for a week.

A few miles south of Sisson, Miss Gray fell into conversation with a pleasant gentleman sitting next to her in the palace-car. He was well-dressed, polite, and very obliging, especially in answering questions about the country, which he thoroughly understood, from long acquaintance. He told her and the girls a good deal about the lumber business on the western coast, in which business he was greatly interested.

"Many square miles of forests," he said, "are destroyed annually to supply the railroads with sleepers. California and Oregon are largely engaged in lumbering. The firs are important trees in Oregon; the cedars, in California. The 'redwood' is the true California tree. It is found in a narrow belt three hundred miles long, extending from Santa Cruz to Oregon, and from the base of the Coast Range to the Pacific."



REDWOOD-TREE FOR THE WORLD'S FAIR.

"Please tell us something about the 'redwood,'" Florence asked.

"The redwoods are gigantic trees when measured by ordinary trees in the eastern part of the country, but are small compared with the 'big trees' of central California. They owe their size to the richness of the soil and the abundance of moisture. Heavy fogs roll in from the Pacific, and cover their branches with needed moisture during the rainless season. The trunks of the redwoods stand as straight as if turned in a lathe. In the perfect tree, the stem tapers to a stiff but slender top spray.

"This tree has many opposite qualities. The butt will sink like a stone, while a log cut from the top of the tree will float on water like cork. From some trees you can split out large boards; in others it is impossible. Some redwoods are soft, and well adapted for turning; others are hard and heavy. Some specimens

are very light in color; others are as dark as black walnut. In some kinds the grain is so straight that you think the lines must have been ruled by hand; in another piece you see the most beautiful curves. Containing no pitch or resin, the redwood does not burn easily; hence it is used to build fireproof warehouses. It does not easily decay; hence its general use for posts, shingles, and sleepers. This wood takes a fine polish, and finishes in a variety of color; hence its extensive use in interior decorations."

"Are these trees large?" Nellie asked.

"Yes; most of them are from two hundred to two hundred and fifty feet in height. Their girth is so great ten men cannot compass the circumference with outstretched arms. One tree will usually furnish enough material to build a large-sized house.

"Many of the trees are so large, they must be split in halves and quarters before they can be transported to the mills. They are not chopped down, as in the East, but are sawed off near the ground; and it is often a full day's work for two men to fell one tree.

"After the tree is down, it is sawed into sections sixteen feet to twenty feet in length, and these sections are hauled up to the road, one by one, by means of donkey engines and strong cables."

"A plank which was exhibited at the World's Fair measured five inches thick, sixteen feet five inches long, and twelve feet nine inches wide."

"What do they do next with the logs?"

"Several of the logs are fastened together to make a 'train,' and six to ten yoke of oxen hitched to the train. The driver at first gently urges each animal to bear



THE LOGGING TRAIN.

equally on the yoke. Then he shouts and yells, urges and screams, till every beast strains himself to the utmost, and the heavy load moves. Once started, the train runs smoothly over level ground; but when it comes to a steep pitch, the logs begin to slide, and faster and faster as each new log comes to the top of the incline. The driver is on the alert, and at the right moment, at a signal, the whole team breaks into a run, tearing down

the hill. It is a run for life or death. Should an animal stumble or fall, it may be the cause of killing half the team. For a few moments it seems a question whether team or train will reach the level ground first. Usually the driver is skilful, and guides the oxen to the bottom in safety, and on to the railroad or mill."

"Do you own saw-mills?"

"I have several."

"How are the logs made into boards?"

"When the railroad is reached, the log is rolled upon a specially prepared platform car, and when seven or eight cars are loaded with one log each, the train starts for the mill, which is just outside the town. Just below the mill, the logs are pushed off the cars, by means of 'timber jacks,' into a moat or sluice, and the fall of each mammoth log is accompanied by a tremendous splashing and churning of the waters.

"Immediately after the arrival of the logs in the sluice a low iron car is seen coming down a steep incline from the mill. Apparently there is nothing to propel the car, and it seems to creep down into the water like a living thing. When it is fairly submerged, two men step upon one of the logs, and by means of long spiked poles they float it along until it rests upon the iron car, which is quite under the water and out of sight. Then a chain is seen to move, and the car comes up out of the water, and creeps slowly up the incline into the mill, bearing the huge log upon its back.

"The log is now rolled upon a movable frame and pushed towards the humming circular saw, and in a few minutes the log is converted into boards, which slide down a chute into the lumber-yard on the other side of

the mill, where they are piled upon flat cars and sent off to the wharf to be loaded upon steamers and schooners for San Francisco. Beneath the circular saws there is an endless cable, which is always moving. This picks up all the waste pieces of wood and also the sawdust, and conveys the whole across the sluice, where they fall into a fire which burns day and night."

"Where is this lumbering business carried on?" Mrs. Cartmell asked.

"It is chiefly carried on directly west of us, over the Cascade Range, within two northwestern counties of the State."

The children thanked the polite lumberman for giving them so much valuable information, and helping to shorten the long, tedious ride in the evening, when the views of the country are hidden from sight.

Mrs. Cartmell, Miss Gray, and the girls accepted the following day a cordial invitation to spend a few days with relatives at Chico. This town is situated in the Sacramento Valley, about half way from Mount Shasta to San Francisco. Mr. Gray, Miss Gray's brother, owns an immense farm in this town, containing twenty-two thousand acres, and facing for four miles the Sacramento River. This farm is as large as a good-sized town in New England. The household grounds contain two hundred acres. Miss Gray, in writing home, thus described the place:—

"Brother Charles lives on a large ranch. The eastern boundary of this ranch is 1500 feet above the valley, and for forty years no expense has been spared to make these 22,000 acres the finest in all the world. It has as many and as beautiful drives as any of the great parks; its streams are as clear as crystal, as

frolicsome as a mountain brook, as romantic as a forest rivulet. Fifteen hundred acres are devoted to the most luxuriant orchards and vineyards; nearly 100 acres to a vegetable garden; 5000 acres to wheat, barley, corn, etc.; nearly 1000 acres to alfalfa.

"Rancho Chico is subdivided into about twenty ranches, any one of which would be supposed to be sufficient to occupy all the time, thought, and money of one man. Each of these ranches has a distinct name. There have often been not less than 2500 head of cattle upon the place; there are now about 1000, 500 head of horses, and 6000 sheep. The yield of wheat last year was about 100,000 bushels, besides 40,000 bushels of barley.

"For variety of crops there are said to be fifty-six different kinds of fruit grown. There are thousands upon thousands of peach, plum, prune, apricot, apple, and cherry trees. There are acres and acres of grape-vines, and eight acres in blackberries. One of the largest cherry-trees in the world stands on this farm: it girths nine feet in circumference, and yields almost a ton of cherries in one season. The fruit is shipped by the carload to the Eastern market. The canning establishment of this ranch is one of the most perfect on the coast, with a capacity of 8000 cans a day. Last year they turned out 75,000 cans of apricots, and in all 370,000 two-pound cans of fruit.

"The cannery is 575 X 120 feet, and three stories high. There are never less than 75 hands at work upon this farm, and in the height of the season 300 are employed.

"The pay-roll is \$100,000 a year. Each week through the year from twelve to twenty head of cattle and from thirty to forty sheep are butchered. The dairy house is 20 X 40 feet, 150 cows of the finest breed are milked on the average, and the sales amount to \$1200 a month. Four acres are devoted to a deer park. From the cupola of the owner's beautiful residence one can look from all this wealth of luxuriance northward to Shasta, the one glacier-honored mountain of Northern California."

LESSON XII.

AT THE GOLDEN GATE.

ON their trip southward Mr. Cartmell was questioned by the boys in reference to the early history and settlement of **California**. From his answers to these questions they learned that the early navigators failed to detect from their ships the narrow entrance to the Golden



SAN FRANCISCO.

Gate, and sailed by without making the discovery. The "finest harbor in the world" was first seen from the land in 1769. The first ship sailed into the Golden Gate in 1775. The great Pacific seaport was first called Yerba Bueña. In 1847 this name was changed to San Francisco. Then Marshall's little boy picked up the yellow pebbles from the bed of the historic canal, the discovery of gold was made known all over the world, and thousands of people sailed for the New Eldorado.

"Is California a large State?" Fred asked.

"It is the second in size in the country. It is very long, and if placed on the Atlantic side, would reach from the eastern part of Maine to Hatteras Inlet, in North Carolina. It is a land of contradictions. In some parts are extensive plains; in other parts tremendous mountains such as we have just seen. In the southern part the traveller finds a land of orange and lemon groves; in the northern part, lumber and grass; in the south, tropical heat; in the north, snowstorms, and drifts thirty feet deep. One county has a great river flowing underground; in another county you can see a river 'all bed,' — no sign of water till you dig below the sand. The Sacramento Valley, where we are now, gives one a cloudless sky for months at a time, while San Francisco will probably furnish us, when we get there, with a fog thick enough 'to be shovelled off the sidewalk.'"

George then read from a paper three stanzas about the wonderful State, written by C. L. Betts:—

CALIFORNIA.

BRIDE of the Sun, thou beautiful Queen of the limitless West,
A tiara of glittering snowpeaks o'er thy proud, imperial crest,
With thy veil of vines and flowers, and eyes of eternal blue,
From the Occident greeting the Orient, heir of the Old and New.

California crowned with summer, thou fairest of fair two-score,
Great is thy name amid nations, bright marvel of mountain and shore :
With gaze fixed full on the future, or lifted to Hope's glad skies,
The stars of a cloudless heaven reflected in thine eyes.

On thy robes the perfume of roses lingers the livelong year,
And the dream-winds of the ocean make music in thine ear;
Child mother, of years most fruitful, whose breasts o'erflow with milk,
The East shall sue for thy favor with spices and gems and silk.

The next day the boys and father found the rest of the family ready to welcome them in the parlors of the Palace Hotel in San Francisco. How much each one had to tell the others of what had happened during the week! The girls had learned that **San Francisco** is the



SAN FRANCISCO AND THE GOLDEN GATE.

great city of the Pacific coast, as New York is of the Atlantic coast. This is owing to its central situation. It is built on the only natural harbor between Astoria, several hundred miles to the north, and San Diego, six hundred miles to the south. The Golden Gate is a narrow opening through a bold mountainous range on the very water's edge. It gives access from the Pacific to a bay large enough to float the navies of the world. The city lies on a peninsula containing several hills, on the west side of this bay.

One of these hills is called "Nob" Hill, three hundred feet high, and containing many elegant residences of wealthy men. Another elevation is called Telegraph Hill.

Along the water front are yards of redwood lumber and warehouses for the storage of grain. Then come streets lined with large wholesale drygoods houses. Montgomery Street has stately office buildings, hotels, and exchanges. Kearney and Market Streets contain large retail stores. The latter street extends to Oakland Ferry, where passage is taken to cross the bay to the growing town of Oakland, the great suburb of "Frisco." Many of the streets ascend very steep



CALIFORNIA STREET, SAN FRANCISCO.

grades, and yet are lined with beautiful residences, like California Street.

To carry the people up and down these steep inclines, the cable-car road was first practically used. It has since been largely introduced into Chicago, Washington, and other places. Its working has been well described by a Chinaman, as told by Fred:—



THE BAY FROM NOB HILL.

"Melican man's wagon no pushee no pullee; all same go top-side hill like flashee."

"The views from these hills," Florence said, "are magnificent. The visitor seems to hang in the air above the body of the city. The buildings and streets of the city, the bay, the ocean, distant islands, passing vessels, cities, towns, and villages, and the peak of Mount Diablo, thirty miles away, form a picture of varied interest. The lights of the city at night are very striking."

The constant rush of travel and the custom of the

people to live in hotels has made it necessary to erect many large and fine establishments in different parts of the city. The Palace Hotel, Fred learned, was considered one of the largest hotels in the world. It can accommodate twelve hundred guests. It cost several million dollars. All its furniture was made in California, of California material. It has three immense inner courts roofed with glass, a marble-tiled promenade, and a beautiful garden filled with tropical and foreign plants. At night, when the electric light illuminates the many tiers of white columns in the centre court, the scene is quite fairylike.

To many, the great attraction of San Francisco is the part of the city occupied by the Chinese, and called "Chinatown." George made a special study of this part of the city. He learned that thirty thousand Chinamen live there in crowded quarters, very much as they do at home. George, Fred, and their father visited the Chinese quarter. Here they saw little stalls with their neatly arranged wares, Chinese flags and lanterns, gambling halls, and "opium-joints." There is a Chinese theatre here, where men, and not women, act. One of the noted Chinese restaurants is called the Bun Sun Low restaurant.

The food here is set out in bowls, and each person helps himself from the common store with a pair of large ebony chopsticks. The tea is made in little cups with covers, every cup being a teapot. The aroma and richness of the Oolong is retained by this process.

Nellie one evening told the boys about a trip to the Golden Gate Park, which contains over one thousand acres, or is twice as large as the largest park in Boston.



A GOOD STREET IN CHINATOWN.

leaves are a yard in diameter.

One of the pleasant drives taken by our friends was to the Cliff House, overlooking the Pacific Ocean. The people of San Francisco are justly proud of the scenery along this drive. Ocean, mountain, and forest combine to invest it with rare charms.

It was transformed into a beautiful place from a barren sandbank. In some parts the trees remind the visitor of a forest. In other places there are numerous walks, drives, and ornamental beds of flowers and richly colored plants. The summer - houses are filled with the most beautiful and choicest flowers. One small lake has several specimens of the Amazon water-lily, whose single



VIEW FROM THE CLIFF HOUSE.

"There are two important ones," replied Miss Gray.

"Where are they situated?"

"The largest one is in Philadelphia. The next in size and importance is in this city. A third one is in New Orleans. We saw the building when we visited that city."

They had a pleasant visit at the Mint. They saw the process of making coins.

"Both gold and silver," said the superintendent of the mint, "are too soft in their pure state for money, so they are made harder by mixing the pure metal, gold, with an alloy of copper and silver, in the proportion of nine hundred parts of gold and one hundred of copper and silver, there being very little of the latter. Silver coins have nine parts silver, and one part copper."

The superintendent then showed them how the ingots

of gold were first rolled into ribbons of the proper width and thickness for the coin to be made. Then a steel punch cuts the gold ribbon into disks. Next, the disks were *milled* by a powerful machine; that is, the edges were made into a border, or rim. Lastly, the disks are fed into the coining machine, and each one stamped by the dies, under enormous pressure. At the same time the edges of the coin are fluted.

"Where are your dies made?" Miss Gray asked.

"They are engraved at Philadelphia for all the mints."

"Do you coin here more silver than gold?"

"No; we coin in value much more gold than silver."

THE GOLDEN GATE.

WITHIN this Golden Gate,—the noblest surely

Of all the entrances of all the seas,—

The Asian barks-of-hope float in securely,

And furl their lateen sails, and ride at ease.

• • • • •
The Golden Gate, indeed ! where cliffs stand sentry,

And mountains heavenward lift their giant forms,

And western gales make rough and dangerous entry

To havens that shut away the wildest storms,—

Fit index for the marvellous City, rising

To granite strength from whelming waves and sands,—

In wealth, in vice, in power, in good, surprising,

Most strange anomaly of human hands !

MORFORD.

LESSON XIII.

OUR NAVY.

Part I.

WHILE in San Francisco, the Cartmell boys visited the Union Iron Works, where several **cruisers** of the **navy** have been built. These works are situated in South San Francisco, and cover an area of twenty-three acres.

"What did you see, Fred?" the girls asked when the brothers returned.

"We saw," replied Fred, "a great many brick buildings filled with heavy machinery, where men were at work forging, riveting, planing, and fitting the various parts of iron ships and mining machinery."

"We saw," added George, "several long sheds, shipyards, and dry docks, and heavy travelling cranes which would easily lift fifty tons. In these sheds were built the noted cruisers, the 'Charleston,' the 'San Francisco,' and the monitor 'Monterey.'"

"What else did you see?" Nellie asked.

"We saw a great ship, now being built in one of the sheds, which was the largest sea-monster I ever beheld. A workman told me it was to be a battle-ship, and to be called the 'Oregon.'"

"I see by the paper," said Mr. Cartmell, "that the cruiser 'Charleston' is now in the bay."



THE "CHARLESTON."

"Oh, can we not go on board?" asked Fred, with much interest.

"I will try to get permits for to-morrow."

The following day all the family went to visit this modern war-ship, called a cruiser.

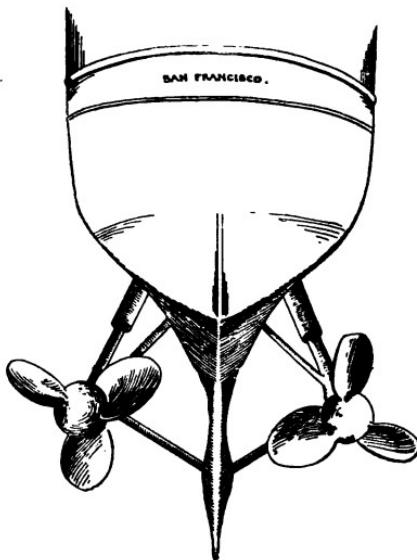
The captain received the Cartmell family, and first escorted them to his cabin, which was a large room, well furnished with every comfort, and having two state-rooms leading from it. They were shown also a large number of pantries, offices, wardrooms, washrooms, and closets for the use of the different officers and men. The berthing-place for the crew was in the centre of the vessel, and well protected, but rather small.

"Captain, how large is the 'Charleston'?"

"She is three hundred and twenty feet long, forty-six feet wide, and draws eighteen feet of water."

"How fast can she go?"

"She can make nineteen knots an hour with forced draught."

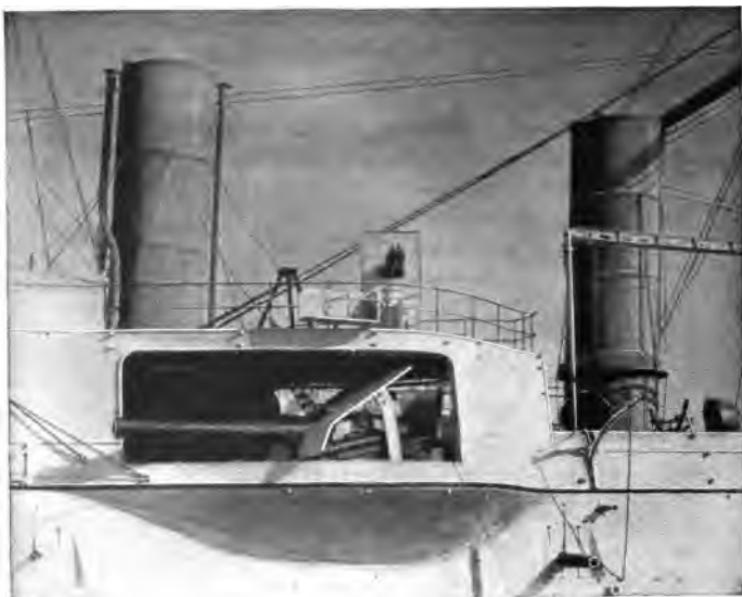


BLADES AND PROPELLERS.

"What do you mean by a 'forced draught'?" Miss Gray asked.

"If you will all come to the fire-room, I will show you."

When they reached this room it was partly opened, and the fires were not burning very brightly, as the ship was not in motion. Then the captain closed the doors, set certain machinery in operation, by which air was forced into the fire-room, and very quickly they noticed how much more brightly the coal burned under the



GUN IN SPONSON.

boilers. This, of course, made steam faster. They also noticed that the room became much warmer, and they were glad enough to go into the engine-room, where it was much cooler.

"How warm does the fire-room sometimes become, Captain, when you are trying to make fast time?"

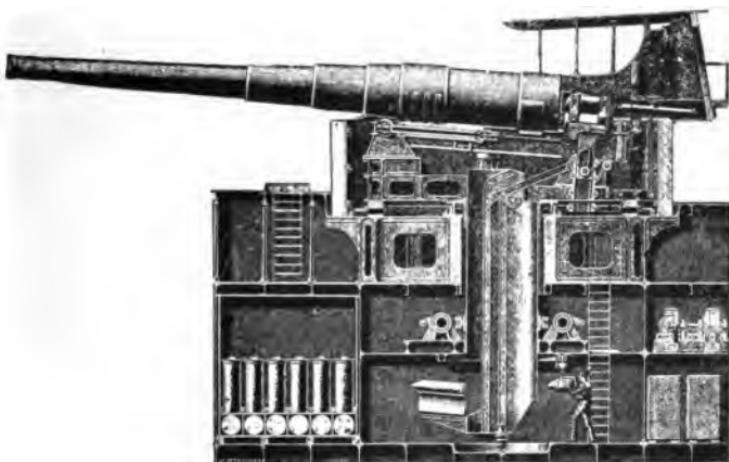
"I have known the heat to become more than 150° . The poor firemen cannot stand such heat for more than fifteen minutes at a time."

"Is there no way to prevent this suffering?"

"Yes. The new armored cruiser, the 'Brooklyn,' has smoke-stacks one hundred feet high. This increases the draught like a tall chimney, and does away with forced

draught, while this new cruiser will have a speed of twenty-six knots."

In the first engine-room they were shown a large compound engine. The children were astonished to find that it contained so many parts. A locomotive



SIX-INCH BREECH-LOADING RIFLE.

seemed a very simple machine in comparison. The crank shafts were very strong, and made of a single forging of steel. The captain told them that every piece of machinery in this room was repeated in the other engine-room, and that the ship could be run by one engine alone, or by both. Each engine is in a separate water-tight compartment, and if one engine becomes disabled, the ship can be moved quite rapidly by the other one.

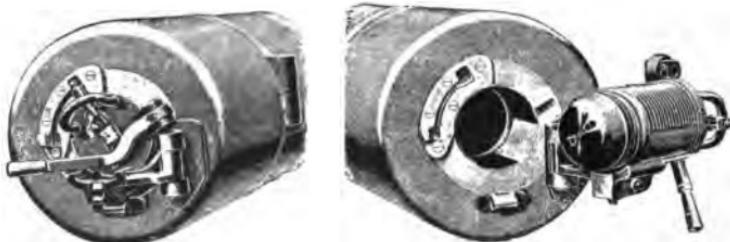
"How large are the screw-blades, Captain?" George asked.

"There are two screws placed at the stern, one on each side of the ship. Each one has three blades, making a diameter of fourteen feet."¹

All parts of the ship were lighted by electricity, even the coal-bunkers.

"Is your ship well ventilated, Captain?" Mrs. Cartmell inquired.

"Yes, Madam; we have two blowers run by steam. They are capable of changing the air at the rate of ten thousand cubic feet per minute. The bad air from the



BREECH-LOADING GUNS, SHUT AND OPEN.

coal-bunkers is drawn into the big chimney, and fresh air comes in from the many fresh-air pipes seen on deck."

The boys were now anxious to go on deck and see the guns; so the party proceeded thither. First the captain showed them the large guns at the sides, in the *sponsons*, or projections.

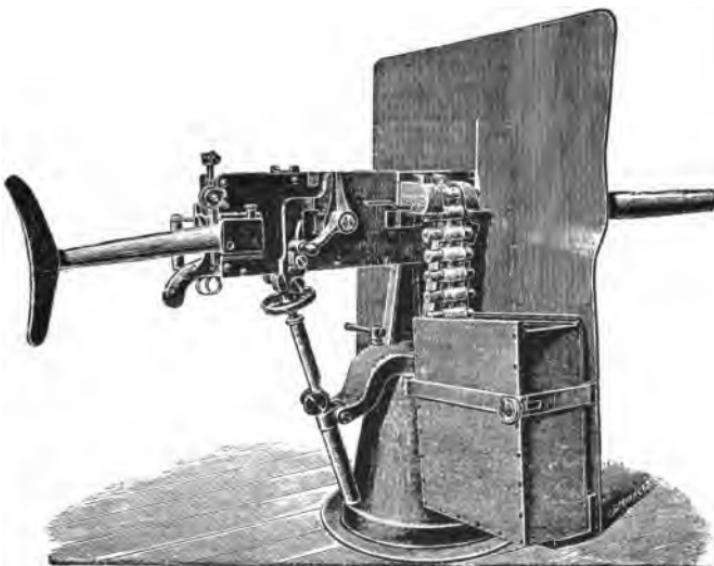
"How many of these guns do you have, Captain, on the 'Charleston'?"

"We have three on a side. These are breech-loading rifles, whose bore is six inches in diameter. These guns

¹ See page 143.

weigh about five tons. They are eighteen and a half feet long; and yet, by means of this machinery, one or two persons can easily move them about, and direct their aim at pleasure."

"How do you load these guns." ¹



RAPID-FIRING GUN.

"The shell and charge of powder, weighing one hundred and fifty pounds, is lifted up and placed in the bore at the open breech, and then this end of the gun is closed by this steel cylinder, or breech-block, having a screw-thread on its outer surface. The charge is fired by electricity."

The captain then led them to the prow of the ship, where they climbed up to the barbette, or elevated plat-

¹ See page 145.

form, as seen in the view of the "Charleston," on page 142. Here they examined the great eight-inch gun, which weighs three times as much as the other big guns. It throws a shell weighing two hundred and fifty pounds, with a charge of one hundred and thirteen pounds of powder, and throws it with such force that it will go through eighteen inches of wrought iron.

"What is this thick piece of iron for, Captain?" Fred inquired.

"That is the shield to protect the men from the fire of the enemy."

They were also shown several rapid-fire rifles, Hotchkiss revolving cannon, and four machine-guns, called "Gatlings," after the name of the inventor.

"Please tell us what that high tower is for, Captain?"

"That is called the 'military mast.' It is hollow, and built of thick plates of steel. It serves as a mark and a place of observation. Two Gatlings are mounted there. From the lower 'conning tower' the captain can steer and direct his vessel at will, fire the great guns, and communicate with every part of the ship."

Av, tear her tattered ensign down !
Long has it waved on high,
And many an eye has danced to see
That banner in the sky.
Beneath it rung the battle shout,
And burst the cannon's roar :
The meteor of the ocean air
Shall sweep the clouds no more !

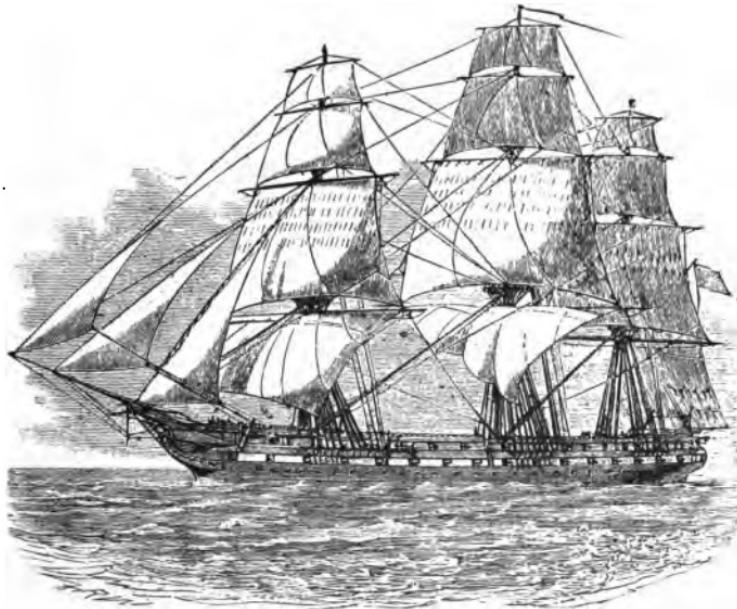
HOLMES.

LESSON XIV.

OUR NAVY.

Part II.

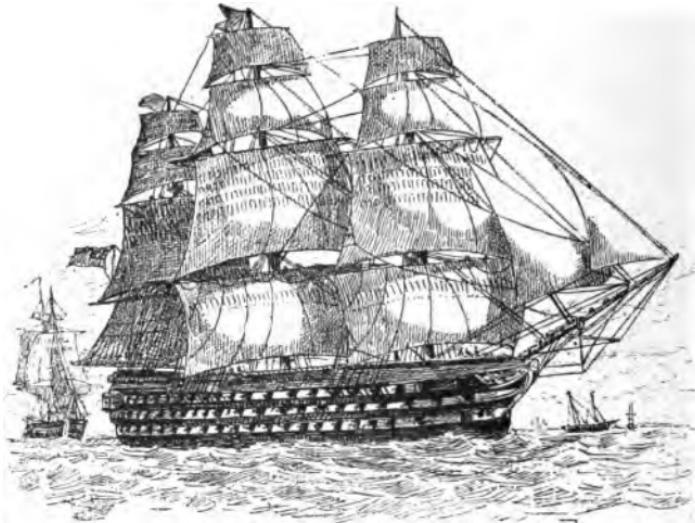
ON their way back to the city Mr. Cartmell told the children that such a ship as the "Charleston" was never dreamed of fifty years ago.



"OLD IRONSIDES," THE "CONSTITUTION."

"Old Ironsides," he said, "which won such famous victories in the War of 1812, was the type of first-class men-of-war.

"These men-of-war were sometimes two-deckers, sometimes three-deckers; that is to say, they had two or three covered decks armed with guns. The 'Constitution' was a two-decker. The heaviest guns were placed



THREE-DECKER MAN-OF-WAR.

on the lower deck. These heavy guns of eighty years ago fired thirty-two-pound solid shots, and the guns weighed each nearly three tons. Some ships carried one hundred and twenty of these guns."

"Four hundred years ago," interrupted Miss Gray, "the ships were much smaller than 'Old Ironsides.' They were generally built with high decks at the ends, like the 'Pinta,' one of the ships in which Columbus discovered the New World. Those ships were frequently made into war-vessels, and armed with guns on all sides and in the three stories."



PINTA.

"Since the Civil War," continued Mr. Cartmell, "and the invention and success of the monitors, **war-ships** have changed completely from wooden vessels moved by sails, to steel moved by steam. Instead of many small-sized, smooth-bore cannon, they are armed with a few very large rifles. These rifles are many of them much larger than the eight-inch one we saw to-day on the 'Charleston.' Our navy has now several vessels which carry thirteen-inch guns.

"The 'Charleston,' you must remember, was one of the first cruisers built. Since she was finished, the Government has made several others, much larger and more costly. About ten of these great war-vessels some-

times join in a summer cruise, and sail from city to city along the coast, or visit foreign ports."

"I remember their coming to Boston, in 1891," said Fred. "They were called the 'White Squadron,' because the ships are painted white. Some of the vessels



THE "CHICAGO."

were the 'Boston,' the 'Philadelphia,' the 'Atlanta,' and the 'Chicago.' Then there were the gunboats,—the 'Petrel' and the 'Yorktown,' and others. Several of these are somewhat larger than the 'Charleston.'"

In the evening Mr. Cartmell again took up the conversation, and told his family something more about the navy.

"The vessel we visited to-day belongs to what are called *unarmored steel*, or *protected* cruisers. Fourteen of them have been built since 1883. They are intended

to protect our commerce and destroy the commerce of the enemy.

"The naval authorities have built a cruiser of extreme speed, which has been in service a short time. It is called the 'Columbia,' and cost nearly three million dollars. This great vessel is four hundred feet long, has triple screws, and moves through the water at the rate of twenty-three knots, or twenty-six and a half miles an hour."

"How is such a vessel protected?" Fred inquired.

"Her deck is protected on the side with four-inch armor, while a water-tight apartment is made next the



THE WHITE SQUADRON.

side for the whole length, and filled with a patent fluid resembling water, to protect the machinery.

"Each of the three engines is in a water-tight apartment, and works independently of the other engines. Any two of the engines might be disabled without interfering

with the working of the third. The ship can run with one screw at the rate of about fifteen knots an hour; with two screws she would make eighteen knots; with the three screws, twenty-three knots.

"In this, and other similar vessels, the coal is placed in bunkers, where it will protect the ship from the enemy. This ship can carry two thousand tons of coal, and steam completely around the world without touching at any port for coal, and without receiving any fresh supplies. She can overtake the swiftest 'grayhounds' on the sea. Six such ships could destroy the commerce of any country as it now exists."

"Father, what is the name of this vessel?"

"She is named, very properly, 'Columbia'; but the sailors call her the 'Pirate.' Perhaps the reason for this is because her true character will not be seen at a distance. Her sides are free from projections, her masts will have no military tops, and no guns will be seen. She will resemble an ordinary merchantman."

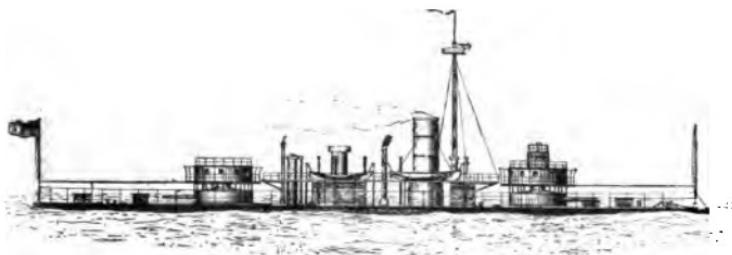
"Please tell us some more about the ships, Papa," said Nellie.

"We have two armored steel cruisers,—the 'New York' and the 'Brooklyn.' These are very large and powerful ships, and combine great offensive and defensive power, with long coal endurance and a high rate of speed. Armor five inches thick is fastened to the sides of these vessels to protect the machinery. Their great guns are well protected by thick steel shields."

"Have we not any monitors?" George inquired.

"Yes; we have six new ones. They are called the 'Puritan,' 'Terror,' 'Monterey,' etc. The one last named was built here in San Francisco, and added to

the Pacific coast defences not long ago. These vessels lie very low in the water. They have two turrets, each carrying two great ten-inch guns and several smaller guns. These big guns are breech-loading rifles, elevated, trained, and loaded by machinery, firing a shot weighing five hundred pounds with two hundred and fifty pounds of powder. The five-hundred-pound shot will go through



"PURITAN."

twenty-three inches of iron at a distance of a mile. The armor is of steel, a foot in thickness. They have a powerful ram."

"Such ships need fear," said Miss Gray, "but few vessels afloat."

"Our navy is to have several battle-ships made like the monitors, to fight other great monitors of destruction. There will be six of these when completed. They are all steel ships, with thick armor on the sides, and carry very heavy guns. The 'Maine' and the 'Texas' are second-class. The 'Massachusetts,' 'Indiana,' and 'Oregon' are first-class coast defenders, and the 'Iowa' is a sea-going battle-ship.

"The 'Indiana' was one of the first of these great



BATTLE-SHIP.

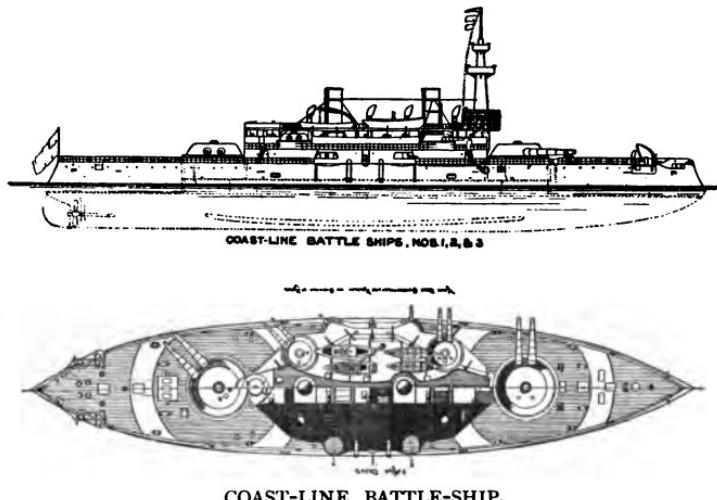
ships to be launched at Philadelphia. She is built of steel three hundred and fifty feet long and seventy feet wide. Her armor is the thickest ever placed upon an American war-ship. In many places it is eighteen inches thick; it is made of *nickel* steel. Above this belt of armor is a casemate backed by ten feet of coal, and in the part where the enemy's shot are most likely to strike there is a belt seven feet high and six feet wide filled with water-excluding material similar to woodite. All the armor is backed by wood and thick plates, which are in turn backed by heavy channel bars."

"How are her guns placed?" Fred asked.

"She has two sloping turrets, one fore and one aft. Each of these contains one thirteen-inch breech-loading rifled gun. These turrets turn so that the 'Indiana' can open fire on the enemy, no matter in what position she may be lying. Then she has eight six-inch

guns mounted in pairs, one above the other, in steel turrets seventeen inches thick, which are still further protected by redoubts of steel.

"In addition to the above-mentioned guns, she has a powerful battery of large rapid-fire guns, four Gatling



COAST-LINE BATTLE-SHIP.

guns, and six torpedo tubes. There are six powerful search-lights along the sides to find out the enemy at night, and to prevent attacks by small boats and torpedoes."

"Is the 'Indiana' the most powerful of our warships?" Florence asked.

"No. We have another ship, larger and more terrible, and that is the 'Iowa,' for she has greater speed, carries more coal, has more defensive power, and can use her guns with greater ease and rapidity. It requires four hundred and eighty trained men to manage such a warship."

"Have other nations such great fighting-ships?" Mrs. Cartmell asked.

"There are four nations which have a more powerful navy than our own. Those countries are England, France, Russia, and Italy. They believe that a navy is the handmaid of commerce."



TORPEDO BOAT "CUSHING."

"Has not the navy some special boats for special objects?" Miss Gray inquired.

"We have two torpedo boats like the 'Cushing.' She was built at Bristol, Rhode Island, and can steam at the rate of twenty-three knots an hour. A knot equals, you remember, 6083.7 feet, or 1.15 statute miles; so she can make twenty-six and a half miles an hour.

"She is a very small boat, and has three torpedo tubes. On a dark night such a vessel might approach a large battle-ship, and place and fire a torpedo which would sink the ship. When seen in the daytime, they can be easily destroyed by machine and rapid-fire guns. The

electric search-light has made their usefulness at night extremely doubtful, and so our Government has thus far built only two. England and France have each more than two hundred, and even Spain has fifteen."

"Do we have a ship on which they use dynamite for powder?"

"The navy has built one dynamite vessel, called, very properly, the 'Vesuvius.' She is in shape like a cruiser, about two hundred and fifty feet long, and capable of moving at the rate of twenty knots.

"She has projecting from the stern three guns of ten-inch calibre, which can throw shells filled with two hundred pounds of dynamite a distance of over a mile. These shells are not fired by powder or dynamite, but by compressed air, for greater safety. There is a main reservoir of compressed air near the keel, and a firing reservoir near the breech of each gun. If one of these shells should explode in or near a ship, the vessel would be blown to atoms. There has been some trouble in making the shells so that they will explode at the right time; hence there is some doubt in reference to the success of this destroyer."

"Papa, please tell us something more about the big guns," George asked.

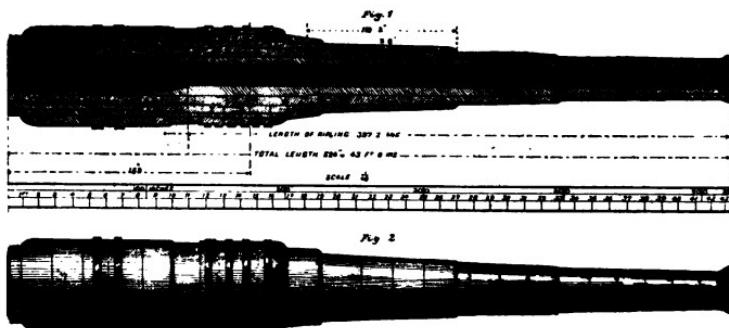
"These are now made, or finished at least, at the great Naval Gun Factory at Washington. The Government buys the material from private firms, and builds up the gun from the parts furnished. First a central tube of the most elastic steel is taken, the required size, having perhaps a thirteen-inch bore, or calibre, forged from a single piece of steel.

"Over the breech-end of the tube is shrunk a steel

jacket, upon the jacket is shrunk a layer of broad steel hoops, and upon the tube in front of the jacket is placed a series of smaller steel hoops, extending to the muzzle. This cut of the Elswick Big Rifle shows how we make our great guns by adding layer after layer of metal.

"After these hoops have been placed in position so as to give great strength to the gun, it is taken to an

- 16-22 INCH AND TON GUN. G.L. MORTAR. GUN AND A BREAST PLATE FOR GUNS 17' 6 AND 7 CYLINDER AND REPLACES 2 HOOPS. 32, 34, 36, 38, 40.
ELSWICK HOT TON GUN.
See R.M.S. Handbook.



BIG GUNS.

immense lathe and rifled; that is, grooves, which twirl round on the inside of the bore one and a half times, are cut half an inch wide and five hundredths of an inch in depth."

"What good do these grooves do, Papa?"

"They cause the shot which is fired to turn round in its flight, and therefore to go farther and in a more direct line."

"How large are these big guns?"

"The twelve-inch guns weigh forty-five tons, and are thirty-seven feet long. The thirteen-inch guns are forty



"THE BLAKE."

feet long, and weigh sixty tons. It takes five hundred and fifty pounds of powder to fire a shell which weighs eleven hundred and fifty pounds."

"Would not such a gun throw a shell a good way, Papa?" Nellie asked.

"Yes, my daughter; it will hurl a shell about ten miles. Ships carrying such guns could anchor at some distance from the nearest land, and bombard most of our great seaports, like Boston, Brooklyn, Portland, and San Francisco. Therefore it is important to have coast-defenders on both the Atlantic and Pacific side of our land."

"Do they make, Father, any big guns in Europe?" George inquired.

"Yes; there are several manufactoryes. The Armstrong and Elswick in England are both very noted. I have shown you cuts of a monster, made at the latter place, weighing one hundred and ten tons, over forty-

three feet long, using nine hundred and sixty pounds of powder to throw a projectile which weighs eighteen hundred pounds."

"I should think that such a gun would cost a good deal," remarked Mrs. Cartmell.

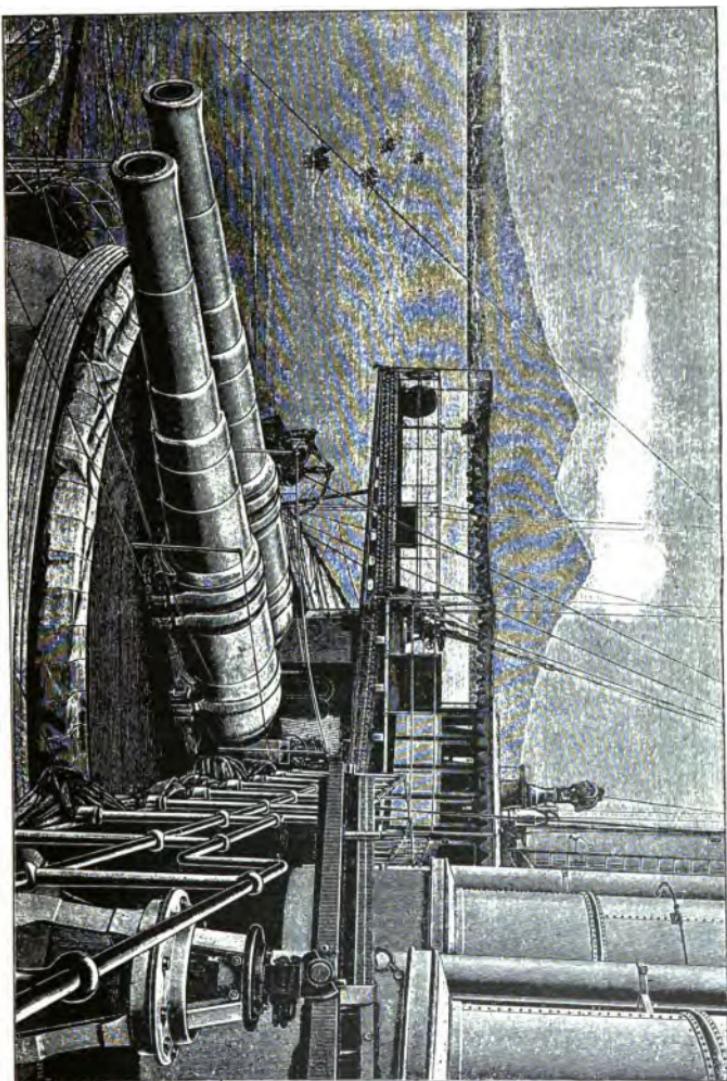
"It does. An Armstrong gun of that size costs about one hundred thousand dollars, and it can be safely fired only seventy-five times. The English warship 'Blake' is armed with several great guns. Its general appearance is like our best warships. The greatest gun factory in the world is Herr Krupp's at Essen, in Prussia. Krupp has been called the 'Cannon King.' Twenty thousand men are employed in his steel and gun factories. The largest rifled gun ever made, weighing over 120 tons, was shown at the World's Fair, in the Krupp exhibit.

"Such heavy guns have to be moved and loaded by hydraulic presses, and hence must be fired very slowly. Both our naval authorities and those of England have concluded to make no more guns of over fifty tons' weight; for these can be moved, loaded, and fired by hand, and therefore more rapidly."

"I have seen," added George, "pictures of big guns on foreign ships mounted in pairs on a barbette."

"The French have some warships thus armed; but these guns can be fired only through an arc of 180°. Several of our warships have large guns so mounted as to be able to fire through an arc of more than 270°, — which makes one set of guns more dangerous to the enemy in certain cases than two pairs of guns which cannot be pointed in more directions."¹

¹ See page 157.



BIG GUNS MOUNTED ON BARBETTE.

"Papa," inquired Fred, "does our navy use smokeless powder, like the nations of Europe?"

"Yes, my son; we have begun to make and use

brown, or smokeless, powder. It has been manufactured in Newport, Rhode Island, at the torpedo station, and will soon be made in other parts of the country. Its use in the large guns gives very remarkable results. Smokeless powder is also used in the small arms, such as the rifles in the regular army. This powder is more powerful, and requires less amount to produce given results than the old-fashioned variety of my younger days."

"Does the United States have a naval school, Miss Gray?"

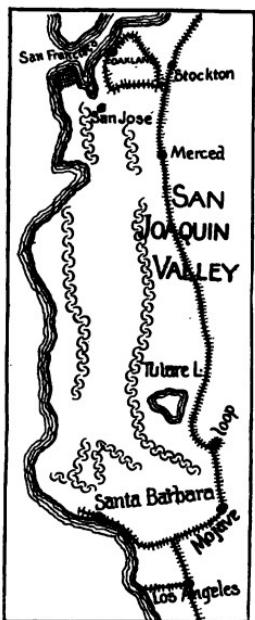
"There has been one at Annapolis since 1845. Boys are admitted, after an examination, if fifteen years old. They are in the school four years, and under very strict discipline, as at West Point. In this time they receive instruction in English, modern languages, drawing, and mathematics; seamanship, naval tactics, and gunnery.

"There are about two hundred and fifty cadets in the school, and about twenty-five graduate each year. The cadets visit the great shipyards at Chester and Philadelphia, to see how ships are built. During the summer months they cruise on practice-ships, and learn to handle the big guns."

"Let us hope," said Mrs. Cartmell, "that the time will soon come when the great nations will disarm, and disputes between countries will be settled by arbitration, as it has been lately between the United States and England."

LESSON XV.

THE BIG TREES.



SOUTHERN CALIFORNIA.

THE Cartmells left San Francisco, about sunset, by the Los Angeles train. They changed cars, about midnight, a little beyond Merced, and reached Raymont, the nearest point to the **Big Trees**, a few hours later. At six A. M. all were up, dressed, and had a hasty breakfast, ready to start by stage-coach for Clark's, or Wawona. The ride was quite unpleasant, and tried the patience of the whole party. But most of the discomforts of the stage-ride were safely ended at nightfall, when they drove up to the Wawona Hotel, and were shown to the clean rooms and enjoyed the excellent table of this first-class house.

Directly after breakfast the next morning Mr. Cartmell engaged a private team of four horses and a good driver to take them all to the nearest grove of Big Trees. As they were riding to the grove, Mr. Cartmell said that "There are several groves of these vegetable giants in the State; but they are all

five thousand or more feet above the sea, and on the Pacific side of the mountains, where they can catch the salt breezes. The two most noted groves are the Mariposa and the Calaveras. The former we are now approaching, not far from the Yosemite Valley ; the latter is farther north, and much nearer San Francisco. We shall visit that on our return."



THE GRIZZLY GIANT.

a Cherokee chief by the name of Sequoyah. Their leaves are somewhat like those of the *Arbor vitæ*. The bark is soft and very spongy, and of a light-brown color."

Larger and larger grew the trees. As each lofty one came in sight, the boys asked, --

"Is not that a Big Tree, Driver?"

And again and again he replied, "Not yet."

When at last their eyes rested upon the giants here and in the other grove, no one was disappointed. But it was hard to realize the real size.

Among the first trees noticed was the one represented in the centre of the picture opposite.

They measured the trunk of the "Grizzly Giant," and found it to be one hundred and one feet in circumference. The lowest branch of this tree is six feet in diameter, large enough to set up as a Big Tree by itself. Many of the other trees in this grove are now higher than the "Giant," because its top has been broken off.

When in the Calaveras Grove, Florence asked, "How old are these trees, Papa?"

"One of the largest was cut down several years ago, and the number of rings around the stump was found to be over twenty-five hundred; so the trees must be over two thousand years old."

During this visit to the celebrated Calaveras Grove, they saw many other trees equally as fine. One of them, called the "Burnt Tree," is hollow, and will allow a person on horseback to ride in at the big end, and ride for two hundred feet in the tree before passing out.

The trees are named after great men and the States. The "Starr King" is said to be three hundred and sixty-six feet high, and fifty-two feet in circumference. The "Empire State" is ninety-four feet in circumference.

George and Fred measured the "Old Dominion," which fell in 1882, and they found it to be three hundred and



LEAVES AND CONE OF BIG TREES.

fifty feet long. As they came near the Big Trees, they passed on the left of the road a little red schoolhouse,



THE PIONEER'S CABIN.

in which school was keeping at the time. The finding of a school in so unexpected a place was a surprise.

The Cartmells brought a dinner-lunch with them, which they ate on top of the side of one of the trees, and they seemed to be in the third story of a house. After dinner they took photographs and drew pictures of the giants. When their carriage and the four horses were brought up for the return trip, Mr. Cartmell directed the driver to wait for them at "Pioneer's Cabin." This tree has been tunnelled, and a road built through it. The driver drove the horses and carriage under the tree, and the leaders' heads were just outside the arch at one side,

while the end of the coach was just outside the arch at the other side.

The children found a great log near a large summer-house. A long ladder was needed to climb from the ground to the top of the log, which was over twenty-five feet in



SUMMER HOUSE BUILT ON STUMP OF BIG TREE.

diameter. The children entered the summer-house, and quickly came out, as if frightened.

"Oh, Mamma, come. This house is built on the stump of a tree."

Mrs. Cartmell went inside, and found it was even so, and that the diameter was thirty-two feet.

The names of some of the Big Trees in this grove are: "Old Bachelor," "Old Maid," "Mother and Son," "Uncle Tom's Cabin," "Daniel Webster," "General Jackson,"



INSIDE SUMMER HOUSE.

"Hermit," "The Three Graces," etc. In one of these trees a man named Smith, an old trapper, lived several years alone, with his dog and horse. "The Sentinels," about fifty feet in circumference, and two hundred and seventy feet in height, stand guard at the entrance of the Calaveras Grove, and make one think of giants at the gate of an enchanted palace.

Not far away stands Mr. Sperry's large and commodious hotel, where the Cartmells stopped and were well entertained.

"Fred, is it true that Bunker Hill Monument would go inside some of these trees, and leave one hundred feet to spare at the top?" Miss Gray asked on their way back to Wawona.

"Yes, I suppose so," replied Fred.



THE SENTINELS, CALAVERAS GROVE, CALIFORNIA.

LESSON XVI.

THE YOSEMITE VALLEY.

MR. CARTMELL and his family, in a private carriage, similar to the one which carried them to the Big Trees, left Wawona the next day about eight o'clock in the morning for the **great valley**. The scenery becomes grander and grander. In a few hours the carriage, drawn by four strong horses, has carried them to a height of six thousand feet, where the views are wild and grand, including, far below, many deep gorges and roaring cascades.

At one place the driver stopped, and baited the ponies. Here everybody left the carriage for a change and a stroll. As if led by blind instinct, all went to a little opening among the trees; and each in turn stood motionless, and gazed upon the grandest panorama of peaks, domes, cascades, valley, and river that the eye of mortal being will ever behold at one place.

“What grandeur!” said one.

“How perfectly lovely!” exclaimed Nellie.

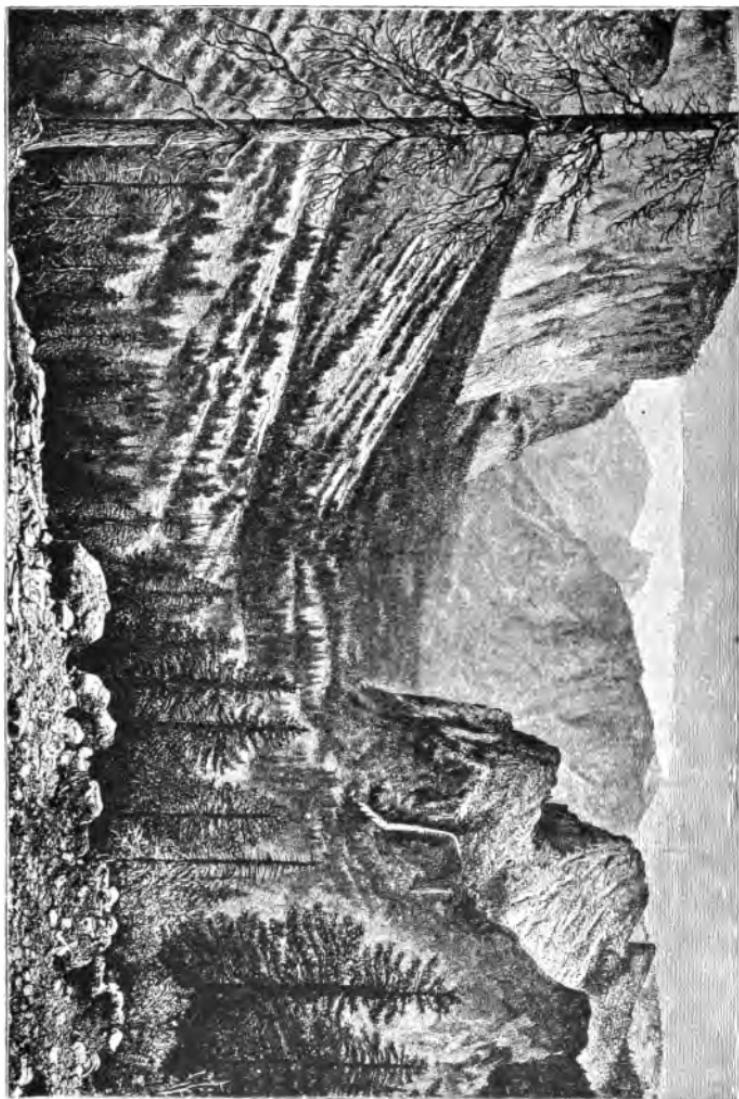
“What wonderful beauty!” cried Florence.

“How majestic and inspiring!” said Miss Gray.

“This is Inspiration Point,” said Mr. Cartmell. “We will have our luncheon here, and enjoy for a while the spell of beauty.”

“What river is that down in the bottom of the valley?”

YOSEMITE VALLEY.



"That is the Merced."

"What cascade is seen on the right?"

"I think that is Bridal Veil Falls. It does not look very high from this point; but I believe the perpendicular height is seven hundred feet."

"The peaks beyond the Bridal Veil Fall," said Miss Gray, "must be the Cathedral Rocks, and that massive



block of bare, smooth, granite wall beyond the Rocks is 'El Capitan,' whose sides are over three thousand feet in perpendicular height."

"Notice," said Mrs. Cartmell, "that tall pines and sturdy oaks grow everywhere, covering mountain side and rocky ledge, as well as the level bottom, with harmonious colors."

In about two hours the party moved forward, and began the descent of six miles into the valley. Miss Gray now showed them a map of the valley, and further explained:—

"The Yosemite Valley is nearly in the centre of the State, north and south. It runs across the middle of the Sierra, and lies nearly east and west. It is about seven miles long, and one half of a mile to a mile wide. It is a great trough, sunk nearly a mile below the neighboring region. At the west end it is narrow and V-shaped. The walls of this valley, I think we shall find almost vertical. To enter the valley we had to ascend, from where we were last night, about thirty-five hundred feet, and now we must descend the same distance."

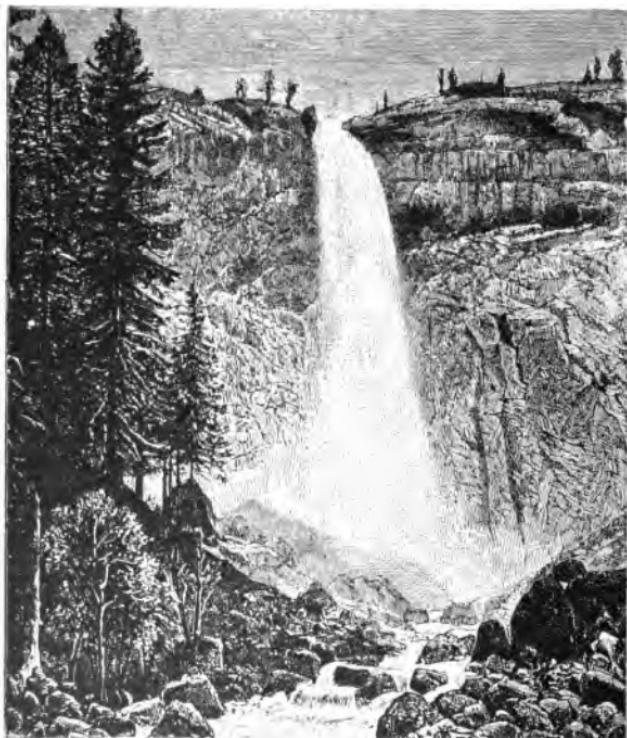
"Why is this valley called 'Yosemite'?"

"When that name was given to the valley, it was supposed to be the Indian term for 'grizzly bear;' and a tribe of Indians by that name formerly lived in the valley."

In a little while Mr. Cartmell and his family reached the level of the valley, and began the drive of over six miles to the Stoneman House, near the upper end. During this drive each one began to realize the immense size of his surroundings. The driver pointed out what seemed to be a doll's Christmas-tree, near the top of El Capitan, and informed his friends that it was by exact measurement one hundred and fifty feet high. The Bridal Veil was more beautiful when seen from the valley than when first observed from the point where they ate their dinner.

Nearly every one was too weary to look about much that night. The next morning, before breakfast, Miss Gray and Florence visited Mirror Lake, at the base of Mount Walkins. They found it, as the Indians call it, "a sleeping water," not a ripple disturbing its rest.

The surrounding peaks were reflected from the great mirror of Nature with remarkable distinctness. As they were looking into the clear depths of the lake, a wonderful scene suddenly opened. Faint flushes of a



NEVADA FALL.

bright color tinged the picture before them, roseate hues gilded each massive peak, and radiant beams shot over the slopes of the granite mountain. The sun had risen in the valley, and been reflected from the surface of the lake in this remarkable way.

After breakfast Mr. Cartmell and all his friends followed up the cañon of the main Merced River. The trail was in some places a little difficult, but nowhere dangerous. They were all the time ascending, winding in and out along the banks of the stream. After about a mile's climbing they arrived, as they crossed a bridge, in sight of the first falls, called the Vernal Fall. These are about four hundred feet high, and regular in form, but far more noisy than Niagara.

By a series of zigzag cuttings in the face of the rock, the sight-seers mounted to a much higher level on this same Merced River, and there beheld the marvellous grandeur of the Nevada Fall.

The whole river here falls over a mountain wall more than six hundred feet high. As the water came rushing down, it changed into froth and foam and flying rockets. Florence said it reminded her of a poem she once read, and of which she remembered these lines:—

“Now shining and twining,
And pouring and roaring,
And glittering and frittering,
And gathering and feathering,
And whitening and brightening,
And quivering and shivering,
And dashing and flashing, and splashing and clashing,
And so never ending, but always descending,
Sounds and motions for ever and ever are blending,
All at once and all o'er, with a mighty uproar;
And this way the water comes down at Lodore.”

Mr. Cartmell and George were greatly enraptured by the imposing view of the Cap of Liberty, as seen from near the foot of the falls.

The next day every one went to see the glory of the



YOSEMITE FALLS.

valley, — the Yosemite Falls, — situated about half way up the valley.

Mr. Cartmell was the first to break the long silence of looking upon this queen of waterfalls.

“This fall is matchless for grace, form, and beauty.”

"It is unsurpassed in size and grandeur!" exclaimed Miss Gray.

"What other falls in the world have such grand surroundings?" inquired Mrs. Cartmell.

The children could not find language to express their thought. After several visits, George attempted to describe the scene in these words: —

"We look up through the trees and see a high precipice, over the smooth face of which there pours a beautiful white sheet of water 1600 feet in unbroken descent. In this long leap it descends into a great trough which it has hollowed out of the mountain. Dashing up great clouds of spray, it bounds on, making a second leap of 450 feet, when it is checked by a projecting ridge. Arrested for a moment, it then plunges still further, and makes a third and final leap of 600 feet, and becomes hidden from view among the green oaks, willows, and poplars that are spread over the plain. The combined height of the three leaps is over 2600 feet."

The different elevations along the sides of the valley have been given names appropriate to form, shape, and position. One is called the "Sentinel," because it seems to stand watchman over the valley; one is called "South Dome," from its position; another, "Half Dome," from its shape. South Dome is very difficult to climb from the valley; but the view from its summit is grander than from Inspiration Point. Near Half Dome is a remarkable echo. If a song is sung, the echoes will repeat it over and over again, now in soft musical whispers, now in tones of louder harmony, till the rocks are vocal with melody. The children were greatly pleased with this echo, and daily visited the spot.



EL CAPITAN.

Another high place is called "Glacier Point." Speaking of his experience here, Dodd, the humorist, says:

"It is something to stop the beatings of a chamois' heart to glance down into the bottomless, awful gulf below. It causes spiders of ice to crawl down one's spine."

The Domes and Cathedral Spires are well named, and beautiful to gaze upon. Other points are called "Covel's Rest," "Grizzly Peak," the "Cap of Liberty;" but the grandest and finest one of all bears the name "El Capitan." The Stoneman House stands not far from its base. Probably nowhere in the world can be seen so square-cut, so lofty, and so imposing a rock. Its nearly perpendicular face is thirty-three hundred feet high.

The longer the Cartmell party remained in the valley, the more delighted they were with their surroundings. Miss Gray endeavored to help the children to see and appreciate as much as possible. One evening she said to them: "Not long ago the Yosemite Indians were the sole owners and occupiers of this valley; now it belongs to the United States as a national park. The Yellowstone Park is another national reservation. Where the Indian noiselessly wandered along the dizzy heights and pitched his wigwams among the falls and pines, now spacious edifices have been reared like this and other hotels. Meadows where once the Indian pastured his stolen horses are now dotted with orchards and gardens. Carriage highways have taken the place of savage's trails, and pleasure-boats float on Mirror Lake and the waters of Merced River. Where a few years ago the Yosemite Indian chief Ah-wah-nee killed the grizzly bear with the limb of a tree, you now see stores, shops, art studios, hotels, a public school, a church, and most of the comforts of modern life."

"What white man first entered the valley?" Fred asked his teacher.

"In 1851 Major Savage, with a company of volunteers, entered the 'Mysterious Deep Valley,' to keep the Yosemites in subjection, as they had been killing the gold-diggers."

The Cartmell family remained in the Yosemite one week, and were very sorry to leave it at the end of the time. They visited next the Big Trees in the Calaveras Grove, and then went to Southern California for a long stay.

LESSON XVII.

CLIMATE ON THE PACIFIC COAST.

FROM the Yosemite Valley and the Big Trees, Mr. Cartmell journeyed southward into the beautiful San Gabriel Valley, in the southern part of the State. He selected for his headquarters for a short time the Raymond Hotel in East Pasadena.

While eating his breakfast with the rest of his family in the beautiful dining-room of this hotel, who should enter and join them but Mr. French, of Boston, who owned the steamer "Verbena," previously referred to in the chapters "Along the Shore" and "Among the Lighthouses."¹ All were pleased enough to see Mr. French again.

"When did you arrive?" asked Miss Gray.

¹ See Fourth Reader

"I reached here two days ago, and thought of going to San Francisco to-morrow to find you. Where have you been lately?"

"We have been spending nearly two weeks in the Yosemite and Calaveras. We had a most delightful trip and splendid weather."

"We saw almost everything," added Nellie.

"How fortunate you must have been!" exclaimed Mr. French.

"Where have you left the 'Verbena,' Mr. French?" Florence inquired, remembering the pleasant days of last year.

"She has been put into winter-quarters in East Boston."

"Have you not been here before, Mr. French?" asked Mrs. Cartmell.

"Yes; I once spent a winter at Los Angeles."

"Then," said Mr. Cartmell, "you must guide us about, and tell us what you think of this part of the world."

"I shall be happy to do so."

From the breakfast-room they adjourned to the broad piazza, and sat for a while enjoying the view and the refreshing breeze. In the distance, towards the north, rose the Sierra Madre Mountains, making an effectual barrier against every rude, cold blast from that direction. They also supply the valley with the much-needed pure water. These mountain outlines are not smooth and forest-covered, as in Vermont, but severe in appearance, and seamed with gorges and chasms of snow.

In the beautiful grounds about the Raymond are seen great varieties of tropical and semi-tropical plants, such as orange-trees, lemon-trees, palms, and cacti.

Many questions were asked Mr. French about his former impressions of the Pacific coast. None at this time were of more interest than those about the **climate**.



FAN PALM, CALIFORNIA.

"I consider," Mr. French remarked, "Southern California to be the Italy of America. Owing to this Italian climate and the peculiar soil in this southern third of the State, the people here engage in different pursuits from what are followed in the northern part. They are agricultural and pastoral. Mining is not common here."

"What is the climate in different parts of the State?" George asked.

"In the valleys in the interior, all through the State, we have great heat.

The San Joaquin Valley, south of San Francisco, hundreds of miles long, and so wide that in places the mountains appear only in the dim distance, as rich and fertile as the valley of the Nile, has heat all summer as great as St. Louis or Washington or Philadelphia has. But it has

always cool nights. The Sacramento Valley thinks nothing of a thermometer of 110°; the Majave Desert records 130° day after day; and even the small valleys in Southern California find the thermometer among the nineties very frequently during the summer. That is not hot, but very warm. But when it is so warm as this, it is only for two or three hours during the day.

At three or four o'clock a breeze springs up from the ocean, or rather the breeze that sprang up at ten or eleven o'clock becomes quite cool; so that often after that time, if one is riding, he needs his light overcoat for comfort, and if one neglects wraps of some kind, he is liable to contract a violent 'cold,' as almost every new-comer does at an early day of his sojourn here.

But in these parts of Southern California that are rightly located with reference to the sea, — that is, so as not to be too much exposed to the northwestern trade-winds, and yet so near as to have the benefit of the



CACTUS.

sea air,—the climate is simply indescribable; never hot and never cold, but just delightfully agreeable every day in the year.

“In autumn and winter the temperature is cold enough to make fires a necessity morning and evening. A thin scum of ice is sometimes formed. The cold is quite penetrating; and yet snow rarely falls, except on the mountains. Flowers take the place of snow-banks. Grain is sown at Christmas time, and roses nod in the soft wind which comes in from the sea.”

“Does it not become very cold by January or February, Mr. French?” Florence inquired, for she was not easily convinced.

“I was riding, on my former trip through this valley, and met a farmer, January 1, going to market with his blue-eyed daughter, who was wearing a sun-bonnet. In his wagon he was carrying, for sale from his farm, oranges, pumpkins, lemons, green-corn, green-peas in the pod, and strawberries.”

“Mr. French,” Miss Gray asked, “is the statement I once read in a book true, that in January all the choicest flowers are in bloom out of doors,—such flowers as heliotropes, nasturtiums, petunias, violets, geraniums, poppies, red, white, yellow, and green roses?”

“Yes; I have seen them all with my own eyes. January, February, March, and April, which months have such disagreeable weather in New England, have here the most perfect weather. The sky is of the deepest blue, the air neither cold nor warm, and laden with the perfumes of orange-blossoms and wild-flowers.”

“Is not this climate very beneficial for invalids?”
Mrs. Cartmell inquired.



WINTER IN CALIFORNIA.

"Certainly. I have known consumptives to be able to be out of doors every day in the year but fifteen. 'Rainy days' are here spoken of as 'better weather.' Most of the rain falls in the night, and picnics can be planned weeks ahead, with certainty of pleasant weather."

"One of the local poets," said Miss Gray, "thus speaks of the rainy season in connection with gold-digging:—

“ ‘ He called his mate, yet brooding there
 Beside the hearth’s departing glare :
 “ Ho, comrade, rouse and hear
 The roaring pines and stormy blast
 Proclaiming summer o’er at last,
 The rainy season near.
 The rain, the rain, the blessed rain
 That brings the harvest to the plain,
 And yellow gold from gulch and vein :
 Hurrah for the rainy season !

“ ‘ “ Though food be scant, and credit gone,
 And claims have petered one by one,
 Away with doubt and fear !
 We ’ve built the flume and dug the ditch ;
 The gravel in Red Ravine is rich ;
 And hark ! the rain is here ! —
 The rain, the rain, the joyful rain
 Now beats the cabin roof amain
 Till every shingle rings again.
 Hurrah for the rainy season ! ” ” ”

“ When we were in San Francisco,” said Mr. Cartmell, “ we learned that the mercury seldom rises there above 80° in the summer, or falls below 40° in the winter. Once, years ago, it went down to 25° above zero. But there are great changes in the thermometer in a single day, variations of 25° during twenty-four hours being not uncommon. During eight months of the year the prevailing wind is southwest. The wind comes up through the Golden Gate about noon, increasing in violence and chilliness till late at night.”

“ Did you learn how much rain falls there ? ”

“ The rainy season begins about the middle of December, and lasts till the end of May. About twenty inches

fall each year, or half as much as we receive in Boston, and one third as much as in Oregon."

"There is much less rain," remarked Mr. French, "in Southern California. San Diego, near Lower California, receives only half as much as San Francisco, and Fort Yuma, on the Colorado River, has only an average fall of four inches."

"Do they have thunder-storms out here?" Nellie inquired.

"Very rarely. One characteristic of the air is its extreme dryness. Things do not mould or rust here. Meats are cured by being hung on a clothes-line in the sun. The fisherman quickly dries his fish on huge racks. Raisins are all sun-dried here."

"I should think," added Miss Gray, "that a climate which will keep dead matter so well, would preserve living tissues."

"So it does. Hundreds of sick people have come here to find a new lease of life."

"Mr. French, what do you consider the most important reasons or causes influencing the climate in this part of the country?"

"The variety of the climate is owing to the great extent of California north and south, the wonderful differences in elevation,—from three hundred feet below the level of the sea to about fifteen thousand feet above. There are, however, some special causes which affect certain very large sections of the State. The great path for rain-storms across the United States is along the northern boundary of the country, north of the central portion of California.

"This path is usually farther south in winter than in

summer, following the sun in its southward course. Hence the rain-storms move farther south, and are more severe in winter (the 'wet season') than they are in summer (the 'dry season'). The nearness of two ocean



THE RIVERSIDE WATER SUPPLY.

currents, one warm, the other cold,—the Japan current and the North Pacific drift-current,—gives rise to a coast climate remarkably different from that of the interior valleys, only a few miles away.

"The cold Pacific current is nearer the coast; but at Point Conception, nearly three hundred miles south of San Francisco, this current is changed in its course towards the west, and farther from the shore, and at

the same time the warm waters farther south are compelled to move northward between the Channel Islands and the shore. Thus, the shores of Southern California are washed by much warmer water than the rest of the State."

"Does not that make sea-bathing very pleasant?"

"The temperature of the waters here is as warm in winter as it is at Newport in June; hence people go in bathing every month in the year."

"If there is so small a fall of rain in this part of the State, Mr. French, how do they raise so much fruit, which requires more or less moisture?" Mr. Cartmell asked.

"The needed water is supplied artificially by irrigation."

"What do you mean by 'irrigation'?" Fred inquired.

"I mean a method of regularly supplying water to land by a system of dams, reservoirs, flumes, ditches, trenches, etc. The fall of rain and snow on the mountains and other elevations about here is considerably more than in the valleys; hence lakes in the far-away hills, or small rivers running from them, or artesian wells, are drawn upon to furnish a supply of water.

"The Santa Anna River flows through a valley to the west of us. Its water was needed for fruit-raising, — especially for oranges, at Riverside. The river was therefore tapped above the town, and canals, well cemented, were constructed. These canals are twelve miles long, and ten to twenty feet wide. Sub-canals lead the water from the main artery to each orange-farm.

"Around the orange-grove runs a deep trench which is filled with water once in thirty days; and from this the water is conducted in furrows, each furrow passing near a tree, but not touching it."



IRRIGATING DITCH.

"Is irrigation carried on in other places?" Florence asked.

"In Los Angeles, only eight miles from this piazza, to the east, in this same beautiful valley, great attention is paid to obtaining water for irrigation; for the soil there is rich, and only needs moisture to yield abundantly. The river of the place is dammed, and the water conducted in a large canal through the city. From the main canal it is carried by branches to each street. Parties are charged at the rate of fifty cents an hour for the use of the water from the ditch, to supply the garden or lawn. The children have merry times sailing their little boats in the ditches.

"San Diego, in the southern part of the State, has

shown still greater enterprise in constructing the Great Flume to carry an ample supply of water from a huge reservoir high up in the mountains, a distance of thirty-five miles, to the city. This flume is built of red cedar, four feet in width, and four feet in depth. It runs along the side of mountains, through tunnels, across valleys, on immense viaducts."

"What are the advantages of irrigation, Papa?" Fred asked.

"Irrigation renders crops secure against loss from drought. It is employed in Europe, where there is an abundance of rain. When water is wisely applied, the farmer raises not only a sure crop, but a larger and better one. Less land will be needed for a good farm under this system. From ten to twenty acres will make a profitable farm. These small farms will bring neighbors nearer together, and do away with farm-loneliness. Most of the section west of the Rockies is deeply interested in irrigation and in the forming of just laws for its control."

DREAM OF CALIFORNIA.

O SOUTH-LAND, O dream-land, with cycles of green ;
O moonlight enchanted by mocking-bird's song ;
Cool sea winds, fair mountains, the fruit-lands between ;
The pepper-trees' shade, and the sunny days long.

Hesperia, Orient, strangely are blended ;
Far sea-voices echo the Mission Bells' chimes.
Fond hopes are renewed and lone heart-aches are ended
Where rose-arbors shelter sweet friends of old times.

BUMSTEAD.

LESSON XVIII.

THREE NOTED PLACES.

THE Cartmells, after the talk about the climate recorded in the last chapter, went out to ride in the vicinity of the Raymond Hotel. They soon learned that their hotel was situated in the higher part of the valley, nearly one thousand feet above the sea. Flowers were in blossom everywhere. Orange-orchards and vine-yards adorned the rolling surface of the land, and the Sierra Madre Mountains towered above them away to the north. In their ride they passed by many handsome villas, surrounded by large gardens and orchards.

In a short time they reached Pasadena, which means, in the Indian language, "the crown of the valley." This valley is walled in, not only by the Sierra Madre, but by the Mission Hills to the south, and another range to the west. The valley is about ninety miles long, and one third as wide.

The Cartmells found Pasadena to be a place of gardens, groves, and vineyards. At the same time, it had many fine blocks and avenues, with miles of stone walks. Fan and date palms lined the sidewalk, the century-plant often did duty as a gate-post, while the grotesque yucca and the broad-leaved banana rustled in the gentle wind as they rode by. Among other streets, they rode through Colorado Street, with its many churches and

COLORADO STREET. PASADENA.



lovely homes. Marengo Avenue was lined with graceful pepper-trees, and Orange Avenue seemed to be cut through an orange-orchard. Many of the houses in other parts of the city were embowered in roses and



LOS ANGELES, CALIFORNIA.

surrounded by palms. In the distance, on the mountains, were to be seen snow-banks.

"The schoolhouses and churches," remarked Fred, "are as fine as those seen in New England."

"So are the houses; and the gardens about them are better than those in the East," said Florence.

Mr. French pointed out several winter homes, large and beautiful, occupied in the winter months by wealthy Chicago people. "Many of the homes," he said, "were surrounded by fruit-orchards, which bring in considerable income without much, if any, outlay."

The party also passed, in their ride, Throop Univer-

sity, a great manual-training college, which is spoken of in another chapter.

During the stay of over two months at the Raymond, Mr. Cartmell and Mr. French, the ladies and the children, visited frequently, in rides and excursions, the interesting places in the vicinity. Riverside, San Gabriel, and Anaheim were a few of the noted places.

A week was spent in Los Angeles, a large and growing city, only eight miles from the Raymond.

While here the Cartmell children went to various points of interest, and learned that the city was a great railroad centre, and that the population had increased from eleven thousand, in 1880, to sixty-five thousand, or more, at present. It is situated in a small valley, on the north side of a river by the same name.

"What is the full Spanish name for the city?" inquired Florence.

"It is in English," Miss Gray replied, "'The City of Our Lady, the Queen of the Angels.'"

They found in their walks many public parks and squares, in which were large collections of choice semi-tropical trees and shrubs, and a great abundance of many-colored flowers. On the different streets were numerous fine business-blocks and many beautiful buildings, such as the High School building, Young Men's Christian Association building, several bank-buildings, churches, and the City Hall, with its imposing square tower and arched entrances. The Court House, Fred learned, cost half a million dollars.

The streets were well paved, the sidewalks being largely covered with concrete, and many lines of electric cars moved constantly through the city. These cars were frequently patronized by the children.



PEPPER TREES, LOS ANGELES.

They saw many fruit-trees in the city, such as oranges, olives, peaches, figs, and even apples and pears. Pepper-trees line some of the walks in one of the parks.

One evening the children asked Mr. French for what Los Angeles was noted.

"She is noted for her climate and as a health resort. This December morning your father and I took a bath in the Pacific Ocean, where we found the water warm and agreeable. At noon we lunched in Pasadena on oranges and strawberries just picked in the garden, and our table was loaded with roses just plucked from the bushes out-doors. At three o'clock we had a tobog-

gan-slide and a sleigh-ride on the top of Mount Wilson. And now, at eight o'clock, we are back in Los Angeles, supping with you."

Mr. Cartmell added: "The seasons may be described as a warm summer, but not too warm; and a cool winter,



HOME OF INDIAN BASKET-MAKERS.

but not cool enough to interfere with the most delicate flowers that bloom the year round."

Mrs. Cartmell and Miss Gray were greatly pleased with the specimens of Indian baskets made by the Pacific Coast Indian women. Sometimes as they rode about they would see the home of one of the basket-makers, such as is shown in the picture.

The basket-makers, they learned, lived in both the northern and southern part of the State.

The baskets made in Los Angeles county were as fine as any made in the State. They were usually made by skilful weaving of grass and willows. Grass was used for the warp, and willows for the woof. The weaving proceeded by a system of steps, or stitches, and provided



INDIAN BASKETS.

for variations in size and shape on the same principle as that applied to knitting or crochet-work. The weaver must remember the number of colored stitches required in every row for each of the figures, and of uncolored ones in the interspaces. For patterns they followed Nature in regard to shape. The acorn was closely imitated; also cones of pine-trees, and many kinds of seeds. The cover for the basket was often shaped after the acorn-cup. The shapes of the baskets were always geometric designs.

The ladies purchased several while in Southern California.

"Mother, what are these baskets used for?" asked Nellie one day.

"The smaller ones are used for holding different articles. The one on the left in the picture was the usual form of the water-bottle. Very large ones were made to hold grain. A lady in Detroit has a fine collection of these California Indian baskets, so lovely in shape, so perfect in closeness of weaving, that not a drop of water can possibly leak through."

At the end of the week spent in Los Angeles the Cartmells visited Riverside, sixty miles farther west, and a natural rival of the former. Riverside was found to be situated on a tableland over eight hundred feet above the sea. It was picturesquely set among mountain ranges which were snow-capped till late in June. Some of the mountain peaks in these ranges were eleven thousand feet high.

In their rides in and about Riverside, the visitors soon concluded that this place was a paradise of orange-orchards, vineyards, and gardens.

Miss Gray said it reminded her of the well-known lines of Goethe:—

"Knowest thou the land where the lemon-trees bloom,
Where the gold orange grows in the deep thicket's gloom,
Where a wind soft from the blue heaven blows,
And the groves are laurel and myrtle and rose?"

Everywhere they saw the flowers and fruits of both the temperate and semi-tropical climes. Ten months out of the twelve this wonderful land produces laurel, myrtle, rose, violet, honeysuckle, jasmine, magnolia,



BANANAS IN CALIFORNIA.

and a host of other sweet-scented flowers; every sort of grain; vines without number; apples, pears, cherries, and watermelons; walnuts and peanuts; olives and strawberries; oranges, lemons, and even bananas.

Daily the Cartmells rode through Magnolia Avenue, "the Grand Drive." They found that this wonderful street was twelve miles long and a hundred and thirty-two feet wide, divided into two carriage ways, and shaded the entire route with pepper and Australian eucalyptus trees. These trees are evergreens. Magnolia-trees

stood at the cross avenues. They also saw numerous fan-palms, aloes, and various sub-tropical plants. Beautiful houses were seen back from the roadway, surrounded by orange-groves loaded with fruit.

This avenue is said to be one of the finest drives in the world; close by is Victoria Avenue, nearly as fine. The irrigation and orange-growing of this section are explained elsewhere.

They rode out at another time to the **ostrich farm** in Riverside. Fred thus described this singular business:

"Three hundred birds are now kept there. The largest is 'Long Tom,' weighing four hundred and fifty pounds.

"He once escaped from his pen, and it took several cowboys, with fresh horses in relays, to capture him, as he can run at the rate of forty miles an hour.

"Ostriches are from nine to ten feet high. They have most beautiful eyes, but their feet are large and ugly looking. They can kick with great force, but it is not true that they will carry men on their backs, as they are very weak in the back.

"They have strange appetites. A gentleman, looking at a number of ostriches one day, took out his watch to see what time it was, when a great ostrich, standing near, snatched watch and chain from the astonished man, and instantly swallowed them. Another ostrich, feeding near a base-ball ground, was seen to swallow a hard green apple, a rubber ball, and two base-balls, without seeming any worse for his strange luncheon.

"Ostriches are very inquisitive and very stupid. They sometimes dance in the morning, round and round, at such a rate that some one of the dancers, becoming giddy, tumbles, and breaks his leg.

"There are now four farms in California, each having about one hundred birds. The business is profitable. Two men can take care of one hundred birds, and it does not cost more to keep



THE GRAND DRIVE, RIVERSIDE, CALIFORNIA.

eight ostriches than one cow. They are kept in corrals or yards, a few together in one yard. They eat alfalfa grass (similar to clover), corn, vegetables, and wagon-loads of shells and bones. They lay about seventy-five eggs a year, each egg valued at \$25. Their feathers are plucked or cut twice a year. They grow on the tail and wings of the bird. A stocking is drawn over the head of each bird before taking away the feathers, to render him



OSTRICHES IN CALIFORNIA.

blind and more easily managed. Even then it is necessary to have four men hold him while the plumes are selected and removed.

"The male ostrich has the most valuable feathers. Feathers forty-two inches long have been produced at the California ranch. The feathers from a single bird have been worth from one hundred to three hundred dollars; but the price now is about fifty dollars.

"The eggs hatch in forty-two days; many are hatched in incubators. The young ostriches are at first about as large as ordinary hens, and are covered with little quills. The ostrich lives to be over one hundred years old."

LESSON XIX.

FRUITS AND VEGETATION IN CALIFORNIA.

THE Cartmells went to ride both forenoon and afternoon, day after day. They found many attractions to see. Everywhere they went they saw orange-groves, as Southern California is noted for the attention paid to the raising of oranges, grapes, and other fruit. Mr. French said, in one of the rides, —

"It requires about nine years to bring an orange-tree from the seed into full bearing. The orange-tree is never a very large tree. When hundreds of years old the trunk is never more than two feet in diameter. Usually grass is not allowed to grow under the orange-trees, as the tree requires all the nourishment. Water is turned on about once a month, and the ground must be frequently stirred, to prevent baking.

"The orange-grove is always lovely. Oftentimes fruit in all stages of growth, from the blossom to the ripe fruit, is seen at once. Oranges are usually gathered from Christmas to July."

"How many oranges grow on a tree, Mr. French?"

"That depends on the age and the kind of trees. The choice seedling I have known to bear, on an average, twenty boxes, each box holding about one hundred and twenty-eight oranges. The older the tree, up to one hundred years, the greater the yield. A box of oranges

contains from ninety-six to two hundred and twenty-six oranges, according to size of fruit. Some navel oranges are so large that ninety-six will fill the box; some seedlings are so small it takes two hundred and twenty-six to fill the same box. By the way, who can tell me the shape of an orange-box?"



ORANGE ORCHARD, SOUTHERN CALIFORNIA.

"It is in the shape of a double cube," George replied.

"The orange," said Mr. Cartmell, "is a berry. It begins to bloom in March in California. In summer the young oranges do not grow very fast; but in the autumn they begin to look yellow. They are not ripe, however, till two or more months later. In Florida the crop ripens from December to March; in this State from January to June."

"In picking, great care is taken not to bruise the



NAVEL ORANGES.



VINEYARD NEAR STOCKTON, CALIFORNIA.

fruit; and hence each orange is clipped from the tree. At the packing-house they are assorted into sizes by a machine called a grader. Then the packer wraps each one separately in tissue-paper. Four cents a box are paid for picking, and the same for packing. Oranges are sold in San Francisco at wholesale for from \$1.50 to \$3.50 per box, according to quality. It costs about ninety cents to send a box to Boston by freight. Orange-orchards are very profitable after they begin to bear well. They usually net their owner from three hundred to seventeen hundred dollars per acre. The fruit is sometimes sold on the trees for three cents an orange."

"What kind of oranges are now considered the best, Mr. French?"

"I believe the favorite variety now is the Washington navel. This orange is large, firm, highly colored, smooth-skinned, and seedless. These oranges are very popular in the East. They are such good bearers, the branches have to be propped. Another favorite is the Malta Blood, which has a fine texture and flavor, with dark-red color; hence the name. The St. Michael is



VINEYARD IN LOS ANGELES COUNTY.

small, very thin skinned, and juicy; it will keep till August. As the different varieties ripen at different seasons, the orange business is active from January to July."

"Please tell us about the growth of raisins."

"Raisins are not made from red grapes, but from white grapes, often called Malaga grapes. The yield of grapes to the acre is from three to thirteen tons. The bunches are cut from the vines when ripe, and placed on redwood trays lying on the ground between the rows.

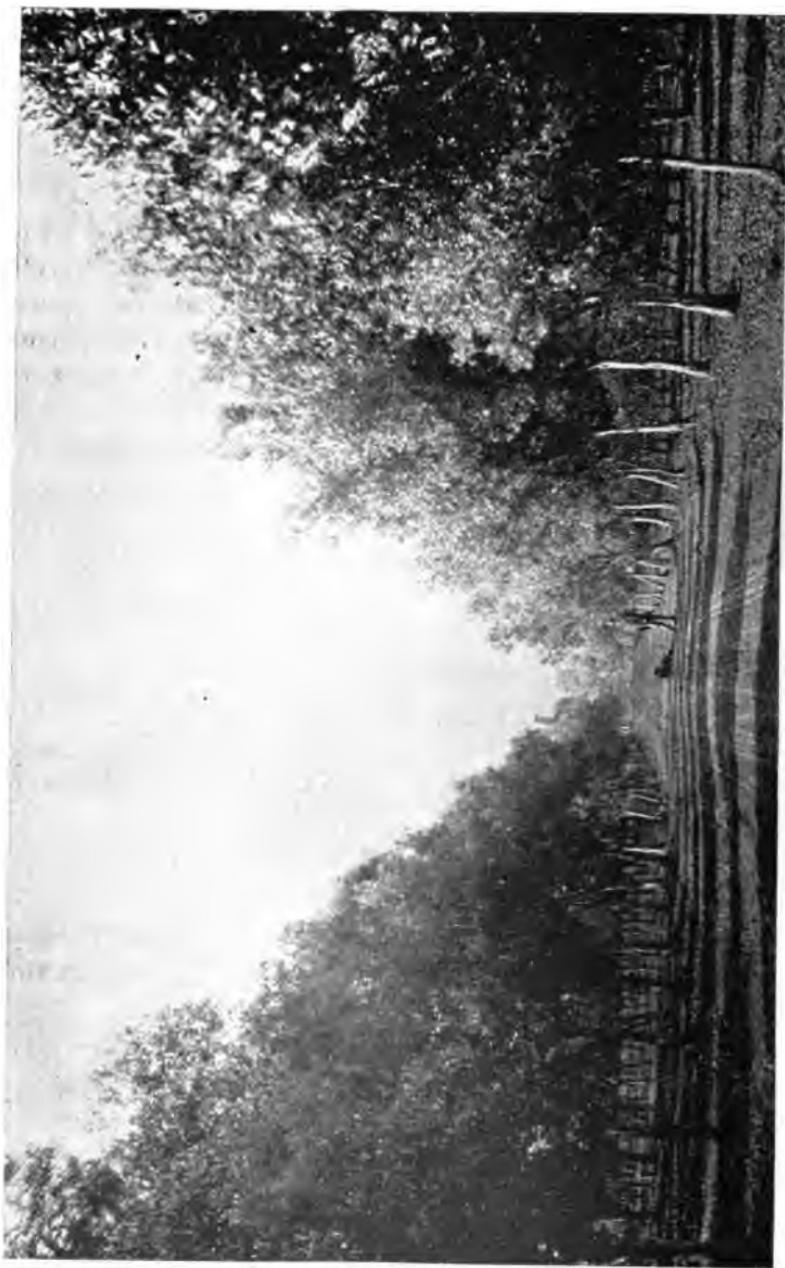
"In two or three weeks the bunches are turned over and allowed to dry on the other side for the same length of time, or until they turn the desired color, and the juice has all evaporated or dried up.

"In the packing-house they are put up in three sizes of boxes,—five pounds, fifteen pounds, and twenty pounds. The latter size is frequently sold at wholesale for \$2.25. About one tenth of the raisins consumed in the United States are now raised in Southern California."

Next they turned their attention to the many vineyards in this part of the State, and the children learned that Los Angeles county has nearly two hundred and fifty thousand acres in grape-vines for making wine and raisins. From these grapes five million gallons of wine and brandy were made in one year. One man has a vineyard here of two thousand acres; another, one of fifteen hundred acres. The vines are trained to grow near the earth, as in Europe. Vineyards flourish as far north as Stockton, near San Francisco. Mr. French also told them:—

"All the raisins consumed in this country were imported till a few years ago, at an expense of millions of dollars, because it was said we had no climate warm enough and dry enough for the profitable raising of this fruit."

"California is becoming quite noted for its olives," Mr. Cartmell remarked. "This tree thrives on every kind of soil when well drained, and not over four hundred feet above the sea. It is grown for making oil and pickles. If grown from cuttings, the tree will produce fruit the fourth year. A well-grown olive-tree will



OLIVE ORCHARD.

produce in a good year over two hundred pounds of fruit. It requires from eight to ten pounds of the fruit to make one large bottle of oil. The tree lives to be very old. The oil is used in many countries instead of butter."

When Mrs. Cartmell was in San Francisco, she learned with much interest about the growth and manufacture



HARVESTING THE INSECT-POWDER PLANT.

of the Persian, or Dalmatian, insect powder, which she had used for years to destroy insects. "In New England," said Mrs. Cartmell, "the powder has been imported in great quantities from Europe. Now a better article is produced in California. A native of Dalmatia emigrated to this State, and then succeeded, with much difficulty, in procuring from his old home a few seeds of this wonderful plant. After three years' experiment in different parts of the State, he found the soil and climate suitable for the alien plant. It was in the San

Joaquin Valley, in Merced County, nearly east of San Francisco.

"The plant is perennial; that is, lives year after year. It grows to the height of thirty inches. It does not produce a paying crop of flowers until it is at least three years old. The insect-powder plant is most productive when it is from four to six years old. It requires constant moisture; hence irrigation is necessary.

"The harvesting time is about the end of May. The stalks are then cut off at the roots of the plant with a sickle. The flowers are stripped off by passing the stems through a coarse kind of comb, which detaches them, and allows them to drop into a box. As each box is filled it is carried to the drying-ground, where the flowers are placed in boxes, and exposed to the rays of the sun, being frequently turned over. At night they are carefully covered, to prevent their absorbing moisture from the dew.

"When the flowers have been thoroughly dried, they are shipped to the mill at Stockton, where they are reduced to powder."

"What use is made of this powder, Mother?" Florence asked.

"This is the insect powder I use at home for killing flies, ants, moths, and mosquitoes. When I put away our furs and woollen clothes in the spring, I sprinkle them with this yellow powder to keep away the moths. I put it under the edges of the carpets when they are put down. I could not keep house without it. Your father uses it for killing the green aphis, or lice, on the apple-trees, and to keep vermin from the hen-house. It is used in different parts of the country to kill cotton-worms, potato-bugs, and grasshoppers."



DRYING THE POWDER-PLANT.

"Will it kill animals?"

"Strange to say, while it is death to insect life, to animal life it is entirely harmless. When roasted, its fumes are not disagreeable, and one can read or sleep undisturbed while the deadly oil in the burned powder kills the annoying mosquito or biting flea."

It was now time for the little folks to retire, and it was necessary to give up, for the present, discussing the nuts, wondrous crops of flowers, the common trees and shrubs and many other growths frequently seen on the Pacific coast.

LESSON XX.

SCHOOLS AMONG THE PACIFIC STATES.

ON the way to Santa Barbara the Cartmell party were discussing their profitable trip beyond the Rockies, and reviewing the many incidents and surprises of the journey. One member spoke of the climate as the most interesting and surprising discovery; another mentioned the fruits; a third, the scenery; a fourth, the mining. But Miss Gray said the interest shown in education surprised her more than anything else.

"I was partly prepared," she continued, "for this by a careful examination of school-reports, and by reading school journals."

"The State of California has as good a school-law as almost any State," remarked Mr. Cartmell. "It was drafted by that veteran educator, John Swett."

"I believe," said Mr. French, as he became more interested in the conversation, "that San Francisco has a fine school system. She spends yearly a very large sum of money for her schools. She pays her teachers good salaries, and thus commands the best talent. The average cost per pupil for education in that city is \$29.30; in Boston it is \$28.23. I have seen in San Francisco some fine school-buildings. The schools are classified as primary, grammar, evening, commercial, and high-school."



RECITATION IN SCIENCE.

"When in San Francisco I visited," said Miss Gray, "one of the grammar-schools, the John Swett School, named after the superintendent. I found that great attention is paid here to language work; but the pupils are required to write upon concrete topics rather than abstract themes, such as 'charity,' 'generosity,' or 'happiness,' once so commonly given out.

"Much time is also spent in this school on elementary science. In each class-room could be seen cabinets of ores, woods, insects, minerals, etc. The windows were occupied by flower-pots filled with growing plants; on

the walls were pictures. These and kindred live subjects formed the topics for compositions and language work. Drawing was also used, as it should be, for expression of thought by means of illustrations."



GRAMMAR-SCHOOL, PASADENA.

"San Francisco has now," George said, "two high-schools; namely, the Boys' High School, and the Girls' High School. Strange to say, the Boys' High School has almost as many girls as it has boys. The Girls' High School occupies a fine three-story brick building.

which can accommodate nearly five hundred students. It has a normal department, presided over by a lady. The Cogswell School is managed by a board of trustees, and furnishes instruction in manual training. Those who graduate from these schools can enter the University of California or the Leland Stanford Jr. University without an entrance examination.

"The evening-schools enroll nearly twenty-five hundred students. The Lincoln has thirty classes. The courses are similar to those in the day-schools. The Commercial School is a public free school, and has about five hundred pupils. Besides this day-school, there is a Commercial Evening School, with a course of study comprising book-keeping, penmanship, stenography, and type-writing. This school has about four hundred pupils."

"I have been greatly pleased," said Miss Gray, after George finished, "to see such fine school-buildings outside of San Francisco. It shows great interest in education in various parts of the State. You all remember the pretty school-house in Pasadena, by which we sometimes rode. That place, I learned, had good schools in all its grades. They were well equipped for practical work. We once passed a pretty school-house at Riverside during recess, and George took a picture for me with his kodak."

"I read, the other day, in a magazine," said George, "the following description of the Riverside schools, written by an Englishman. You will notice, as I read, what struck him as peculiar:—

"There is one feature in the city government which is of supreme importance to *pater-familias* with a family of children,



A PUBLIC SCHOOL, RIVERSIDE.

and that is the number and equipment of its schools; for all are good, and all are free. But boys and girls mingle together at every one; the classes are of both sexes. This is the rule, from the kindergarten to the high or grammar school.' To an Englishman, a grammar-school is one where the boys study the languages and sciences."

"A teacher who lives in Riverside tells me," said Miss Gray, "the children are perfect angels in school, all on account of the wonderful climate, and teachers think school is Paradise."

"The Pacific coast believes in the higher education," said Mr. Cartmell. "The high schools are well patronized, and many fine buildings have been noticed by me as we travelled about. I remember a splendid building in Los Angeles, which would do great credit to a larger and much older city in New England."

"Are there many normal schools in the State, Mr. Cartmell?" Miss Gray inquired.

"There are, I believe, only two State normal schools, and a normal department or school in San Francisco. You remember the Normal School building in Los Angeles, which is the home of the State Normal for Southern California. The other State Normal is in San José, near San Francisco. These schools are doing good work in preparing teachers for educating the children."

"Are there not, Mr. French, several noted colleges on the Pacific?" George asked.

"Yes. Several were founded thirty or forty years ago. One of the largest of these is St. Ignatius College, in San Francisco. The University of California is non-sectarian. It is at Berkeley, eight miles from San Francisco. There are several small colleges scattered about the State.

"When we were in Pasadena, we passed by several times the new buildings of the Throop University. This college is named after its founder. Mr. Throop made his money in Chicago. After fifty years of business activity, he moved to Pasadena, and spent a part of his fortune in erecting churches and schools for the good of the people.

"The special object of this school is to foster a higher appreciation of the value and dignity of manual labor.



HIGH SCHOOL, LOS ANGELES.

The manual-training department is therefore the largest, and it is carried on in a separate building. It is open for both sexes."

"California not only has many excellent schools and colleges," said Mr. Cartmell, "but she has a number of noted observatories. Mr. French and I visited Mount

Wilson when we were in Los Angeles. We went there by cable and electric railroad. Near the Echo House, at the summit of the mountain, stands the Harvard Observatory, situated, according to President Eliot, in the most favored position for observation, on account of the clearness of the air."



STATE NORMAL SCHOOL, LOS ANGELES.

"Two years ago I visited," said Mr. French, "another observatory. It was on a high mountain between two ridges of the Coast Range, not far from San José,—a city south of San Francisco. The name of this mountain is Mount Hamilton. We rode to the top of this mountain in about six hours. The scenery is varied

and beautiful. In the last portion of the ride the road curved round and round across the face of the mountain, till near the summit it encircled the height three times. One of Clark's largest and finest telescopes points to the heavens from Mount Hamilton. It is a 36-inch instrument. The tube is made of steel, and, with the mounting, weighs several tons; yet it can be handled with the



LICK OBSERVATORY.

greatest ease, and moved towards any quarter of the heavens."

"Why is it called the Lick Observatory, Mr. French?"

"That was the name of the man who gave seven hundred thousand dollars for the erection and equipment of the observatory. In South America, a Spanish priest interested Mr. Lick in astronomy; hence he gave a large part of his fortune to the advancement of his favorite science."

"I think," said Mr. Cartmell, "the college best known to-day in the East is the one at Palo Alto, not far from San José. It is called the Leland Stanford Jr. University."

"How did it happen to have such a strange name?" Fred inquired.

"It was founded by Senator Stanford to commemorate the name of his son, an only child, who died a few years ago. Hence it bears his name. The object of the University is to qualify students for personal success and direct usefulness in life, to teach the blessings of liberty, and to inculcate a love and respect for the great principles of government.

"The property conveyed to the University by Mr. and Mrs. Stanford is said to be worth fifteen million dollars. It consists of great estates, on which grapes and wheat are raised. The buildings are to form a series of quadrangles, somewhat like the college-buildings in Oxford, England. Those already erected are mostly one or two stories high, and built of buff sandstone. The roofs are covered with red tile. The style of architecture can be found in the Spanish Missions of the State. One of the halls is provided with electric lights, hot and cold water, steam-heat, bathrooms on each floor, and the rooms are furnished for the students. Tuition is free, and board is furnished at cost."

There is a large and strong corps of instructors, selected from various colleges in the country. The students come mainly from the Pacific Coast States; but nearly every State in the Union is represented, and Canada, Japan, and the Hawaiian Islands.

LESSON XXI.

THE MISSIONS OF CALIFORNIA.

THE ride to Santa Barbara became very interesting as the train approached the sea-side. The last thirty miles are in sight of the deep blue ocean, and it almost seems as if the traveller were out on the water, sailing. The ocean surf can be heard beating under the train as though it were beating against the sides of a ship. The cool breeze from the water fans the brow, and feels welcome even in winter months.

Santa Barbara is a famous sea-coast resort, nearly west of Los Angeles. It is frequently described as "having its feet bathed by the warm blue waters of the Pacific, and its head pillow'd on the mountains of Santa Ynez." Some travellers think the bay resembles in contour the Bay of Naples. A glance at a map of California will show how the Santa Barbara Bay is protected from the ocean by four long mountainous islands.

The town of Santa Barbara is well built and pleasantly situated. It has a long, wide business street, well paved, and containing many elegant stores. This street extends through the town, from the wharf to the mission, three miles away. The shorter side-streets contain beautiful homes, surrounded by gardens filled with numerous shrubs and trees. Roses are seen everywhere.

Three hundred varieties are said to be grown on some of the large estates in the neighborhood.

"Well, Mr. Cartmell," said Mr. French, after a week had passed in pleasant excursions in the vicinity, "how do you enjoy this climate?"



SANTA BARBARA BAY.

"It seems almost perfect," he replied. "Can you explain the causes?"

"It is owing entirely to the peculiar situation. In this part of California the foothills come down very near the coast, and afford very complete protection in that direction, on account of their height. This town is situated forty miles south of Point Conception and the Ynez Mountains, whose tops are three fourths of a mile above our hotel. Their summits thus ward off the cold northwest winds. The gentle slope of this valley is towards the south. The Channel Islands cut off all



MISSION, SANTA BARBARA.

chilly southwest winds, and the waters of the Pacific, at the same time, prevent the weather becoming too warm. Hence the thermometer rarely rises above 82°, or falls below 42°."

"I understand," added Miss Gray, "that Santa Barbara has neither summer nor winter in its calendar, but continual spring. Its climate resembles Nice, in Europe. There are three hundred and ten days in the year when invalids can be out of doors six hours or more. The tenderest flowers are ever in bloom."

Mrs. Cartmell, Miss Gray, and the children frequently visited the old Franciscan **Mission**, which stands on elevated land overlooking the entire valley. The double towers, not usual in these buildings, and their clear white color, in contrast with the green in nature, make the mission very conspicuous.

"What can you tell us about this mission, Mamma?" Florence asked, during their first visit.

"This is not one of the oldest missions in the state, but it is one of the best preserved. It was founded in 1786. The buildings were completed in 1794, so they are over one hundred years old."

The party were admitted and shown about the place by one of the priests, or *padres*, dressed in the coarse



INTERIOR CHURCH, SANTA BARBARA.

robes of his order. His face was cleanly shaved, his hair cropped very short, and his feet were encased in sandals. Mrs. Cartmell and her friends were first led into the reception room, — a small, but tastefully arranged apartment. The walls were hung with pictures, and the floor laid in colored cement. From this room they entered the church.

As shown in the picture, it is very long and narrow. Numerous banners, paintings, images, and crucifixes of gold and silver hang upon the walls. The nave is lighted

by six small windows. The walls of this church are eight feet thick and forty feet high.

A door from the church led on one side to the garden, and on the other to the cemetery; but the party were not taken through either door, because no woman is allowed to enter either place. Mr. French afterwards visited the garden, and told the children that he saw a beautiful fountain in the centre, surrounded by many trees and flowering shrubs. Dark-green ivy grew over the sides of the church and the high walls. On one side he saw a corridor with open arches. Birds sang among the trees, and the air was laden with the perfume of roses and heliotrope.

On their way back from the mission, the children asked several questions. "Is not this mission in a better state of preservation than the one which we visited near Los Angeles?"

"Yes, it is," replied Mrs. Cartmell. "Most of the missions are now in ruins. As Italy, Germany, England, and Spain have their celebrated ruins, so has California in these missions."

"Please tell us, Teacher, something about their history," Florence asked.

"All the mission buildings," began Miss Gray, "have a sad, but very interesting story to tell about the heroic deeds of noble men, who labored for the good of their fellow-creatures. Father Serra was one of this band of noble men. He came from Mexico to California in 1769, to establish missions to convert the Indians. The first mission was founded by him in the southern part of the state, at San Diego. He walked all the way from

Mexico, when he was suffering great pain from lameness, because he was so anxious to begin the work.

"Two years later he started a mission farther north, at San Gabriel, which we visited a few weeks ago. The building which now remains standing in that place was



MISSION OF SAN GABRIEL.

not erected, however, till 1804. And this has suffered some decided changes, such as replacing the red picturesque tiles with modern, flat shingles. The San Gabriel Mission became very large at one time, having five thousand Indians gathered about it. Another mission was soon afterwards founded, not far from San Gabriel, and then one away to the north, at Monterey. Afterwards, twenty more missions were established, forming a chain of religious and fortified posts about six hundred miles long."

"Were all these missions like this one at Santa Barbara?" Fred inquired.

"The buildings were after the same general plan, being arranged in the form of a square, with a court-yard in the centre. This was a kind of Moorish architecture. It has been followed in the buildings of the Leland Stanford University.¹ The church formed one side of the square. A long corridor, covered with a low, red-tiled roof, supported by numerous arches, formed another. The two remaining sides were filled in by buildings, used for sleeping-places and workshops, and by a high adobe wall. All the walls were strongly built, as each mission was at once a religious station, a fortress, and a town."

"Who lived in the missions, Miss Gray, besides the Franciscan Fathers?" George asked.

"As the object of the missions was to convert the heathen Indians, the latter were encouraged in various ways to come to the missions through curiosity, and in hopes of gifts. The fathers were very kind to them. They gave them food and clothes, taught them how to till the soil, and how to raise wheat and vegetables. They taught the Indian men different trades. Some of them became carpenters, blacksmiths, and stone-cutters. The men helped to build the churches and other structures."

"Did the women learn anything?" Nellie asked.

"The Indian maidens were taken into the buildings; and there and in the enclosed garden they worked and sang, and seemed very happy. The fathers patiently taught these dusky girls how to spin and prepare cotton

¹ See page 225. The California building at the World's Fair was modelled after the style of the Missions.

for cloth, how to weave blankets, and to make table-cloths, towels, and white dresses.

"As fast as possible, the Indians were taught the principles of Christianity, baptized, and confirmed as members of the Church. In a few years many of these savage Indians became quiet and civilized persons, giving up the chase and war to live happy, contented lives with their friends in and about the missions."

"What did they do each day?" Fred asked.

"There was great regularity in their daily lives. At daybreak they proceeded to the chapel, for mass. After eating their simple breakfast of roasted barley, they went to their various fields of labor. About twelve o'clock the noon-day meal was eaten. This consisted usually of beef or mutton. At five o'clock work was suspended, and all gathered again in the chapel to listen to the Angelus and the Litany. This occupied about one hour, after which the evening meal was served.

"In this simple, happy way these small communities prospered for fifty years. The Indians advanced in civilization and all the peaceful arts. The missions gradually grew rich, and to be envied. The various missions at last were said to contain over thirty thousand Indian converts, a million head of cattle and sheep, and to raise annually one hundred and twenty-five thousand bushels of wheat and corn. This prosperity was their ruin. The Mexican Government coveted this great wealth, and passed an act to seize the possessions of the Church. Between 1833 and 1842, the missions were plundered, the *padres* driven away, and the buildings either ruined or destroyed altogether. The poor

Indians were robbed of their lands and homes, and scattered abroad to roam through the valleys and in the mountains in search of food and shelter."

"How sad a story! Has no one tried to help these Indians?" Florence asked.



MISSION OF SAN DIEGO.

"Yes," replied her mother; "Helen Hunt Jackson, 'H. H.' became greatly interested in these long-suffering people. She visited California a few years ago, and studied up their history and needs. She wrote this wonderful story I hold in my hand, called 'Ramona,' which you can read at your leisure."

During the next four days the children read "Ramona" to one another. After finishing it, they were anxious to visit the "Camulos Ranch," where the heroine of the story, Ramona, lived. On the way back to Los Angeles, they stopped at this place. The story was their guide-book, and nearly every place mentioned was

found as "H. H." described it. The characters in the story seemed to live again.

The Cartmells' next journey was to San Diego. Here the ladies and children continued their study of mission life by visiting at once the mission buildings in "Old San Diego," — a romantic spot, with its adobe structures, palm-trees, and orange-groves. They found it, as shown in the picture, a crumbling ruin; its roof partly fallen in, its arches open to the sky, the windows gone, and showing everywhere the effect of that relentless destroyer, — Time.

"Even the bells are gone!" exclaimed George. Afterwards they found them removed to a village six miles away, where they hang suspended from a cross-beam, in the open air.



MISSION BELLS, SAN DIEGO.

LESSON XXII.

SAN DIEGO AND PHœNIX,—THEN HOMeward.

OUR friends spent several weeks in Southern California and in Arizona.

Their headquarters in **San Diego** were in the Hotel Coronado, on the beach. This hotel is an immense



HOTEL CORONADO, SAN DIEGO.

structure, covering seven and a half acres, and may be considered a fair rival of the Ponce De Leon Hotel in St. Augustine.¹

¹ See Fourth Book, page 12.

The hotel is situated on a tongue of land, with a matchless ocean beach on one side, stretching away for miles, and a quiet, peaceful bay on the other. There are in the vicinity broad avenues, fine parks, and charming walks well shaded with trees.

While staying in San Diego, Florence wrote to her Aunt Catherine the following letter:—

SAN DIEGO, CAL., March 1, 1893.

MY DEAREST AUNT,—Our Western trip has been one constant source of surprises and delights. Each day seems more and more enjoyable. We first gazed with awe upon the vast sublimities of the "Rockies;" then we visited the silver and gold mines, and studied the regular army which protects the lives and property of the western pioneers. A delightful journey was afterwards taken to the glaciers of Alaska. From this far north we slowly retreated to the Golden Gate and learned about our growing navy. Big trees, wonderful valleys and waterfalls next engaged our attention. Finally we settled down to enjoy life more quietly in different parts of Southern California.

You must spend next winter in this glorious climate. I know it will cure your cough at once and for all time. It is a grand climate to be lazy in. Cloudless skies, glorious sunshine, blossoming flowers, singing birds are our constant delight; everything is lovely but the earthquakes,—and we don't mind those, only just the second or two that things shake; they do no harm, only make one feel a little unsteady for a second.

I remarked one day to the hotel proprietor, "What a fine day it is!" The man looked at me in amazement, and said, after a pause, "Of course it is a fine day; why not? Every day is a fine day in this part of the world."

San Diego is an attractive place and full of enterprise. It has grown very fast and now numbers over 16,000 inhabitants.

It lacked water like other places in this part of the world, the

fall of rain being annually very small. It had no river like Los Angeles, so the water had to be brought from the nearest mountains in a great flume thirty-six miles long. The flume crosses the valleys on high trestles and runs through the mountains in tunnels, some of which are half a mile long. Four years were spent in its construction, and the cost was over one million dollars.

Everything in California is on a large scale. The county of San Diego is twice as large as Massachusetts. The fruits of the temperate zone and the tropics here grow side by side, and the yield of vegetables and fruits is immense. We are finding many delightful trips to take in and about San Diego. Yesterday we visited the ruins of the old Mission Church. To-morrow we are going to see the building on the *plaza* in which Romona was married, in Mrs. Jackson's great Indian story. It was in this town that the gifted authoress gathered the incidents of her wonderful romance.

We expect to return east before long, and when I see you again and Cousin Mary, I will tell you more about our trip.

Your loving niece,

FLORENCE.

The next week Mr. Cartmell and Mr. French visited Arizona on business. They went by the Atchison, Topeka, and Santa Fé railroad to Phœnix, the capital.

Instead of a desert covered with sage-bush and cactus spread out before them everywhere, they saw in many places green fields of alfalfa, waving grain, and orange-trees. They learned that the reddish-brown soil of the valleys becomes highly productive just as soon as it is abundantly watered.

The historical Gila River flows across the southern part of Arizona. One of its tributaries is called the Salt River. The valley on each side of the latter river has been thoroughly irrigated. To do this a great dam

was built across the river, one thousand feet long, and over one hundred miles of main canals constructed, sufficient to water one hundred and seventy-five thousand acres of land, which nearly equals one seventh of the state of Delaware.



AN ARIZONA IRRIGATING CANAL.

In this Salt River Valley Mr. Cartmell and Mr. French saw great ranches, or farms, of oranges, grapes, peaches, prunes, lemons, dates, and figs. Two crops of figs, two of beets, and five of alfalfa are produced in a year. All the different fruits mature in Arizona very early,—even one month earlier than in California. Ears of corn ready for roasting are gathered in from five to six weeks after planting the seed.

The town of Phœnix was found to be an enterprising and progressive American place. The principal streets

and avenues are very wide, through which flow streams of pure water. Shade-trees line both sides of these streets.

They are lighted by electricity, and electric cars run through them. On the return trip, Mr. Cartmell remarked to Mr. French, "I am surprised at what we have seen. Phoenix is certainly the gateway to the great mineral stores in the mountains farther north."

About the middle of April, Mr. Cartmell, Mr. French, and the ladies and children began their **homeward** trip over the Santa Fé route through Northern Arizona and



RANCH NEAR PHOENIX, ARIZONA.

New Mexico. The first place of interest was the Mohave Desert, in the southeastern part of California. This basin is undoubtedly the bed of the Gulf of California, which has slowly retired. The railway gradually descends into this bed, and for a long distance runs upon the fine sand that was once at the bottom of the ocean. Sleepers are placed upon the sand, rails upon these

sleepers; no embankments are needed. The mountains, which rise to the right and left, once formed the banks of the gulf.



STREET SCENE, PHœNIX, ARIZONA.

The children were greatly annoyed by the fine dust, which came into the cars, notwithstanding the closely fitted double windows, and covered everything with a heavy coating of flour. They did not like the dreary landscape, without vegetation.

Mr. French said, at the close of the day:—

“I like this part of the trip, because it reminds me of the East. There are the same decided colors of the desert,—the brilliant yellow sand, the hard blue sky, the frequent mirage, the aspect of grandeur and soli-

tude which so much impressed me a few years ago in Egypt."

The northern part of Arizona shows evidence of a volcanic age. Vegetation is confined to sage-bush and cactus.

In New Mexico, a few days were passed at Santa Fé, visiting Fort Marcy, the cathedral, and examining the low adobe houses, many of which were very old; for Santa Fé is considered by some persons to be even older than St. Augustine.



SAGE-BUSH, ARIZONA.

Mrs. Cartmell and Miss Gray were most interested in visiting the room in a building on the *plaza* in which Gen. Lew Wallace penned his famous "Ben Hur."

From Santa Fé, the remaining portion of the trip to Lake View in Massachusetts took place without special incident.

APPENDIX.

HOW TO MAKE LANTERN SLIDES.

By J. CHAUNCEY LYFORD, PRINCIPAL, WINSLOW STREET SCHOOL,
WORCESTER, MASS.

TEACHERS would make use of the solar camera, or magic lantern, were it not for the expensiveness of a good working set of illustrative slides. At fifty cents each, one can purchase but a limited number, and it is not often that those most wanted can in any way be secured. This applies especially to maps, explanatory charts, and diagrams. Almost every day we discover in the course of our reading, materials of these kinds which would be extremely valuable in the class-room, were they but available. Were it well understood that the processes of slide-making are simple and easily mastered, many a teacher would practise them with the most gratifying success. And in these days of popular photography, when every one is provided with much of the necessary apparatus, the outlay for a beginning is only a trifle. Give up a week at the seashore, and all is done. Then, with a slight additional expense from year to year, such a collection of slides would grow up as is rarely seen,—large and select, and with a value for teaching purposes beyond estimate. If teachers in various parts of the world should co-operate in this good work, exchanging and loaning both negatives and positives, there would be no limit to the material that might thus be brought together. Moreover, a collection thus made would be stamped with the individuality of its owner, and would have



NEEDED APPARATUS AND MATERIALS.

a value far beyond that of any ready-made set bought direct from the dealers.

The beginner will need a camera of some sort, — which, with accessories, need not cost above twenty dollars, — and a closet or small room from which the light can be excluded. The bathroom may often be utilized, by shutting out the daylight except what may be admitted through a small pane of ruby glass. Then he must have the following : —

- 1 doz. Dry Plates, "Carbutt B" for Negatives.
- 1 doz. " " " Carbutt A" for Positives.
- 1 Printing Frame.
- 1 Square Tray for developing.
- 1 Square Tray for fixing.
- 1 oz. Hydrochloric acid.
- ½ lb. Sulphite of Soda (crystals).
- ½ lb. Carbonate of Potash (granular).
- 5 lbs. Hyposulphite of Soda.
- ¼ lb. Powdered Alum.

The regulation size for lantern-slides is $3\frac{1}{4}$ in. by 4 in., and it will be well to make the first negatives on plates of about this size, so that the slides may be made by contact-printing, — the method best adapted to learners. There is no reason why directions for negative-making should here be given; every box of dry plates gives them in detail. The negative should have a long scale of gradations, from very light to very dark, so that the resulting slide may have plenty of "snap," and yet have sufficient softness to give pleasure to the eye. The finished negative should be placed in the printing-frame glass side down, and upon it film to film an unexposed plate ("Carbutt A"). This, of course, must be done in the dark room by the ruby light. From a distance of two feet, expose for about ten seconds to the light of an ordinary hand kerosene-lamp. Perhaps the exposure will be too long, perhaps too short; if either, try again. The experience derived from a few trials will give one confidence and certainty. The plate is now ready for development. Make up the following solution: —

Water, 2 ounces.
Sulphite of Soda, 40 grains.
Hydrochinon, 10 grains.
Carbonate of Potash, 30 grains.

Having placed the exposed plate in a clean tray, pour on the developer, and watch for the appearance of the image, rocking the tray vigorously meanwhile. Continue until the details in every part of the picture are clearly visible; and just precisely at the time when the last light portions of the plate begin to darken, empty the solution from the tray, supplying in its place cold water from the faucet. In a minute the plate may be removed to the fixing solution, which must not in any case, even in the smallest degree, be allowed to contaminate the developing solution. In another tray then fix in a bath made by putting a heaping handful of hyposulphite of soda in a quart of water.

When, in the course of ten minutes, the plate has become transparent, it may be placed for a few moments in some water to which a little alum has been added, then swabbed with cotton-wool, and when washed in running water for fifteen minutes, it may be set aside to dry spontaneously. Finally, a mat may be cut from black paper, which, with the slide, may be bound up with a protective covering of glass. The completed slide will by no means be perfect ; but the next one will be a better one, and in a little while troubles will disappear. The description of the process seems long, but it is not longer than a plain recipe for making bread.

When, in this simple way, we have achieved a measure of success, we shall look about for a more practical and workmanlike method, — one adapted to the rapid production of inexpensive slides of the very best quality. To one who is gifted with nimble fingers and a soft touch (and there must be a degree of patience too) the old-fashioned wet-plate process is perfection itself, and the various steps are here given in full.

Glass. — This may be new, thin, and free from scratches and bubbles, or it may be old negatives from the nearest friendly photographer's. It should be cut exactly $3\frac{1}{4}$ in. by 4 in. A steel glass-cutter may be bought at the glazier's for fifteen cents.

Cleaning Glass. — New glass should be immersed twenty-four hours in a jar of water made very sharp with nitric acid, then carefully scrubbed with a brush, rinsed, and racked away to dry without wiping. The films on old glass may be removed by boiling a half hour in sal-soda and water ; then the old glass is as good as new, and may be treated as such.

Albumenizing. — Take the white of a perfectly fresh egg, and, having removed the germ, beat to a froth with a "Dover egg-beater." Then put into a bottle containing a quart of clear tap-water ; shake thoroughly and filter through absorbent cotton. This will keep indefinitely, with the addition of a little ammonia ; otherwise it will quickly spoil. With a small camel's-hair brush

apply a line of albumen to the edge of one face of the glass. Set aside till dry. This edging will hold to the glass the collodion film, soon to be described. Any amount of glass may be thus prepared during odd moments, evenings, etc., as it will not deteriorate, if kept in a dry place.

Nitrate of Silver Bath.—Purchase at a stock dealer's a vertical glass tank ; one that holds a quart or two is much better than a smaller one. This is to contain the sensitizing bath, made up as follows : To each ounce of water add forty grains nitrate of silver, and make slightly acid by the addition of two or three drops of nitric acid to the quart of solution. Set in the sunshine a day or two, and filter off the precipitate that will appear. The bath ought now to be clear as crystal, and ready to work. For the above purpose, it is best to use ice-water, or rain-water caught towards the end of a storm. For a dipper, a piece of glass a foot long and two inches wide may be secured. At one end make a narrow lip, by bending to a right angle. This is easily kept chemically clean,—a very important matter.

Collodion.—There are many kinds. The following is excellent :

4 oz. Alcohol.

4 oz. Ether.

32 grs. Iodide of Ammonium.

24 grs. Bromide of Cadmium.

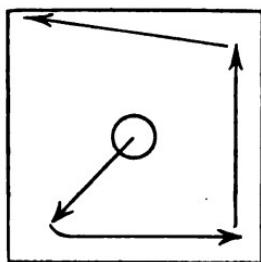
48 grs. Gun Cotton.

Mix in the order mentioned, shake till the cotton is well dissolved, set aside for three or four days, when it will be ready for use. For the best results, three or four kinds of collodion should be kept on hand, as sometimes when one kind is out of temper, another will be in the best of humor.

Collodionizing.—Grasp one corner of an albumenized plate between the thumb and forefinger of the left hand, and with the right pour on a small quantity of collodion, tipping the plate till every part is covered, draining the surplus back into the bottle. Rock the plate back and forth sideways, so that the

film will not dry in ridges, and when the collodion has set, immerse the plate in the silver bath by means of the glass dipper.

The accompanying diagram will make clearer how the collodion should flow.



From the time of the immersion, all subsequent operations should be performed in yellow light, such as may be obtained by pasting a thickness or two of buff or yellow dry-goods wrapping-paper over the glass of a window. It is well to enclose the tank in a covered box, so that the operator may open the

dark-room door without injury to the plate. At the end of three to five minutes the plate will be sensitized. Withdraw from the bath, wipe the back with a clean cloth or blotting-paper, and place in the plate-holder.

Exposure. — On the opposite page is a convenient arrangement for making the exposures.

As will be seen, the camera should be pointed towards the sky, and arranged to slide on a board so that negatives of various sizes may be used. No specific time can be given, as much depends upon the age and condition of the collodion and silver-bath. Try ten or fifteen seconds; if on development the sky quickly veils, the exposure was too long; if the details of the picture are with difficulty brought out, a longer exposure was needed.

Developer. —

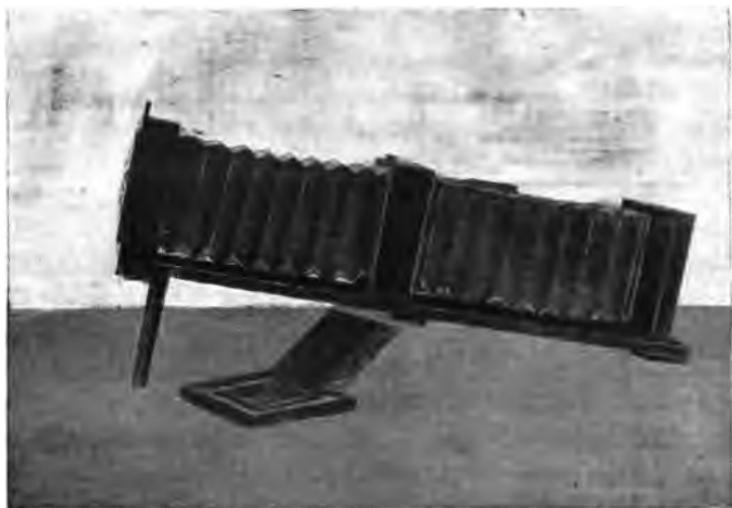
Water, 2 ounces.

Protosulphate of Iron, 60 grains.

Acetic Acid, No. 8, $\frac{1}{2}$ ounce.

Development. — Again take the plate by the corner in the left hand, and with a careful steady motion flow upon one end sufficient developer to cover the whole plate, keeping it moving all

the while, that it may not develop in streaks. See also that the developer does not run off the plate, — a matter of much conse-



EXPOSURE.

quence. At once, just as the high lights begin to veil, thrust the plate under the faucet, and wash away the developer; then fix.

Fixing solution.—

Cyanide of Potassium, 1 oz.
Water, 8 oz.

or

Hyposulphite of Soda, 1 oz.
Water, 4 oz.

The former is deadly poison, but in several respects much the better of the two. The plate should be immersed in the solution till thoroughly cleared. Wash carefully and dry.

Matting and Binding. — There is a paper used in box-manufacturing shops which is white on one side, and black on the other. This is excellent for the separator mats, as it is opaque, and at

the same time a label may be written on the white surface. The mat should be cut to the size of the slide, and should have a rectangular or square opening not more than $2\frac{3}{4}$ in. by 3 in. The dimensions may vary within those limits, but should not exceed them. Paste the dark side to the slide at one end, then write the label, and bind up with a clean piece of glass as a protector. For binding, the kind of paper known as black newspaper is cheap and good enough. The strips should be one half inch wide, and about sixteen inches long. Flour or starch paste is much better for the purpose than any kind of mucilage.

Let no one be deterred from beginning by this lengthy description of the process. A slide may be made in a fraction of the time required to write about it; from eight to ten successes per hour being among the possibilities. Likely enough, many difficulties and vexations will occur; but after a few trials these will vanish, and slide-making will become a pleasant pastime. Then, too, there is always some accessible one who has already travelled the rugged road of experience, and who is only waiting for an opportunity to lend a helping hand. Among such is the writer of these lines.

A LIST OF POEMS.

A FEW poems have been quoted in this volume ; but the vast amount of other matter has precluded extended reference to noted poetical selections such as the field copiously offered. The poems listed below can be found principally in "Poems of Places," vol. xxxix., the writings of Bret Harte, Bayard Taylor, and of Joaquin Miller. "A Little Book of Western Verse," by Eugene Field, and "Rhymes of the Rockies," collected by S. K. Hooper, Denver, contain also a number of the poems.

THE ROCKY MOUNTAINS.

THE GARDEN OF THE GODS	Butler.
MOUNT OF THE HOLY CROSS	Vischer.
CASTLE GATE	Tabor.
MANITOU	Vangassen.
THE BLACK CAÑON	Sherrick.
VETA PASS	Pearson.
SUNSET ON GREAT SALT LAKE	Tabor.
CHEYENNE CAÑON	Wood.
SIERRA BLANCA	Stepleton.
MARSHALL PASS	Mitchell.
WAGON WHEEL GAP	Wasson.
THE ROYAL GORGE	Ferguson.
FREMONT PASS	Dillenback.
MARTHY'S YOUNKIT	Field.
THE LUCK OF A SILVER MINE	Bacon.

OUR LADY OF THE MINE	<i>Field.</i>
THE "CONVERSAZZHYORRY"	<i>Field.</i>
ON THE ROCKY MOUNTAINS	<i>Pike.</i>
ROCKY MOUNTAINS	<i>Anon.</i>

CALIFORNIA.

THE CAÑON	<i>Miller.</i>
THE BIG TREES	<i>Bret Harte.</i>
CALIFORNIA	<i>Miller.</i>
ON LEAVING CALIFORNIA	<i>Taylor.</i>
DOW'S FLAT	<i>Bret Harte.</i>
PASO DEL MAR	<i>Taylor.</i>
POINT LOBOS	<i>Stoddard.</i>
SACRAMENTO RIVER	<i>Taylor.</i>
MISSION DOLORES	<i>Bret Harte.</i>
SAN FRANCISCO	<i>Bret Harte.</i>
THE GOLDEN GATE	<i>Pollock.</i>
SAN FRANCISCO, 1800	<i>Bret Harte.</i>
AT THE GOLDEN GATE	<i>Morford.</i>
A CALIFORNIA SUNSET	<i>Urmy.</i>
SPRINGS OF SAN JOAQUIN	<i>Bret Harte.</i>
SOCIETY UPON THE STANISLOW	<i>Bret Harte.</i>
TO THE SIERRAS	<i>Owen.</i>
TRUTHFUL JAMES	<i>Bret Harte.</i>
JIM BARKER	<i>Elderkin.</i>
ROBINSON'S KID	<i>Ross Defforis.</i>

FAR WEST.

ALASKA	<i>Bret Harte.</i>
THE FAR WEST	<i>Longfellow.</i>
THE PIONEERS	<i>Mackay.</i>
ARIZONA	<i>Miller.</i>
BIG HORN, MONTANA	<i>Longfellow.</i>

CUSTER	<i>Stedman.</i>
DAKOTA (FROM " HIAWATHA ")	<i>Longfellow.</i>
MOUNT ROSE, NEVADA	<i>Kaye.</i>
THE PLAINS	<i>Miller.</i>
THE RISING COLUMBIA	<i>Gibson.</i>
CHINOOK	<i>W. L. M.</i>
" PISEN ON HOSSBACK "	<i>Kaye.</i>

BOOKS CONSULTED.

In preparing the present volume, a large number of books and magazines have been carefully read, and valuable facts gleaned from their perusal for use in the preparation of this book. The Author here acknowledges his indebtedness to the following volumes, and recommends their consultation to those teachers and readers who desire more complete information upon the section herein treated: —

ALASKA	<i>Dall.</i>
ALASKA	<i>Whymper.</i>
ALASKA	<i>Jackson.</i>
JOURNEYS IN ALASKA	<i>Seidmore.</i>
A TRIP TO ALASKA	<i>Wardman.</i>
THE NEW ELDORADO	<i>Ballou.</i>
FIFTH AVENUE TO AKASKA	<i>Pierrepont.</i>
CALIFORNIA AND ALASKA	<i>Webb.</i>
OUR ARCTIC PROVIDENCE	<i>Elliott.</i>
SHORES AND ALPS OF ALASKA	<i>Karr.</i>
ICE AGE IN AMERICA	<i>Wright.</i>
THE YUKON	<i>Schwatka.</i>
AMONG THE ALASKANS	<i>Wright.</i>
THE WEST FROM A CAR WINDOW	<i>Davis.</i>
THE ROUND TRIP	<i>Clark.</i>
THE PACIFIC COAST SCENIC TOUR	<i>Finck.</i>
CALIFORNIA	<i>Hutchings.</i>
CALIFORNIA	<i>Nordhoff.</i>
THE CALIFORNIANS	<i>Fisher.</i>

CALIFORNIA OF THE SOUTH	<i>Lindley.</i>
SOUTHERN CALIFORNIA	<i>Van Dyke.</i>
SAN FRANCISCO	<i>Lloyd.</i>
TO THE GOLDEN LAND	<i>Shorey.</i>
THE MEDITERRANEAN SHORES OF AMERICA	<i>Remondino.</i>
THE WONDERS OF THE YOSEMITE	<i>Kneeland.</i>
SANTA BARBARA	<i>Roberts.</i>
SANTA BARBARA ISLANDS	<i>Johnstone.</i>
COLORADO	<i>Dall.</i>
RANCH NOTES IN COLORADO	<i>Aldridge.</i>
ROCKY MOUNTAINS	<i>Bird.</i>
CAMPS IN THE ROCKIES	<i>Baillie-Graham.</i>
PACIFIC COAST	<i>Baddam.</i>
SPANISH INSTITUTIONS OF THE SOUTHWEST	<i>Blackmar.</i>
SPORTING IN THE FAR WEST	<i>Murray.</i>
OREGON	<i>Nash.</i>
THE APACHE CAMPAIGN	<i>Bourke.</i>
RHYMES OF THE ROCKIES	<i>Hooper.</i>
THE WILDERNESS HUNTER	<i>Roosevelt.</i>
WEST POINT	<i>Boynton.</i>
THE DEVELOPMENT OF NAVIES	<i>Wilmont.</i>
ARMIES OF TO-DAY	<i>Published by Harper's.</i>
ANNUAL REPORT OF THE SEC'Y OF THE NAVY	
ANNUAL REPORT OF THE SEC'Y OF WAR	
THE MODERN INFANTRY RIFLE	<i>Blunt.</i>
THE NAVAL ANNUAL	<i>Brassey.</i>
TENTING ON THE PLAINS	<i>Custer.</i>
BOOTS AND SADDLES	<i>Custer.</i>
FOLLOWING THE GUIDON	<i>Custer.</i>
PRACTICAL GOLD MINING	<i>Lock.</i>
METALLURGY	<i>Percy.</i>
THE METALLURGY OF SILVER	<i>Eissler.</i>
THE CALIFORNIA MAGAZINE	<i>San Francisco</i>
THE NEW ENGLAND MAGAZINE	<i>Boston.</i>

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